



Career Guide to **America's TOP INDUSTRIES**

Sixth Edition

Essential Data on Job Opportunities in Over 40 Industries



Explore different sectors for your best career prospects.

- Substantial descriptions of all major U.S. industries, with details on changes, job opportunities, projected growth, training and education needed, earnings, advancement, working conditions, and more
- Excellent overview of the most current employment, industry, and technology trends
- Information on each industry's career paths and major jobs, cross-referenced to the *Occupational Outlook Handbook*, another main source of career data

By the U.S. Department of Labor, Bureau of Labor Statistics

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America's Career Publisher

As the Economy Changes, Consider Various Industries for Career Opportunities

Nonstop changes in the economy have far-reaching effects on employment in the industries covered in this unique guide. Job seekers and students should be aware of these changes and keep alert for developments that can affect job opportunities. Consider, for example, these changes over the 10-year period ending in 2012:

- * Health services will account for the most new jobs, about 3.5 million.
- * Educational services is expected to grow by nearly 20 percent, adding about 2.5 million new jobs.
- * Employment in one of the nation's fastest growing industries—employment services—is expected to increase by more than 50 percent, adding another 1.8 million jobs.
- * Almost 760,000 new jobs are expected to arise in state and local government.


Career Guide to America's Top Industries is your *best* resource for these and many other career-influencing facts.

New in This Edition

This new edition of *Career Guide to America's Top Industries* provides the latest labor market information and also features the following changes:

- * The industries described have been reorganized into 10 major groups that reflect the newest developments in the economy.
- * All data has been updated for the 10-year period ending in 2012.
- * All job titles are cross-referenced to the latest *Occupational Outlook Handbook*.
- * This is the first edition of the *Career Guide to America's Top Industries* to be classified by the North American Industry Classification System (NAICS). NAICS defines industries and establishes a structure for relating industries to one another. Prior editions classified industries by the Standard Industrial Classification (SIC), which is no longer being used by federal statistical programs.
- * An index makes it easier than ever to find information of interest.

Call 1-800-648-JIST or visit www.jist.com for more details.



Career Guide to **America's TOP INDUSTRIES**

Sixth Edition

Essential Data on Job Opportunities in Over 40 Industries

Published by JIST Works, this book's industry descriptions are a complete reprint of the entire contents of the *Career Guide to Industries* (Bulletin 2571) as produced by the good people at the U.S. Department of Labor.

**Part of
America's
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Series**

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America's Career Publisher

Career Guide to America's Top Industries, Sixth Edition
Essential Data on Job Opportunities in Over 40 Industries

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The industry information contained in JIST Publishing's *Career Guide to America's Top Industries* presents a general, composite description of firms and jobs and cannot be expected to reflect work situations in specific establishments or localities. The *Career Guide*, therefore, is not intended and should not be used as a guide for determining wages, hours, the right of a particular union to represent workers, appropriate bargaining units, or formal job evaluation systems. Nor should earnings data in the *Career Guide* be used to compute future loss of earnings in adjudication proceedings involving work injuries or accidental deaths.

Credits. This book is a complete reprint of the original *Career Guide to Industries*, published by the good people at the Bureau of Labor Statistics, U.S. Department of Labor. Here is the text, from the original, providing credits to the many people who worked on it:

The Bureau of Labor Statistics produced the *Career Guide to Industries* under the general guidance and direction of Michael W. Horrigan, Assistant Commissioner for Occupational Statistics and Employment Projections, and Mike Pilot, Chief, Division of Occupational Outlook. Chester C. Levine and Jon Q. Sargent, Managers of Occupational Outlook Studies, provided planning and day-to-day direction.

Supervisors overseeing the research and preparation of material were Douglas Braddock, Theresa Cosca, Arlene K. Dohm, and Carolyn Veneri. Occupational analysts who contributed material were Azure Albeck, Andrew D. Alpert, Jill Auyer, Hall Dillon, Tamara Dillon, Erika Heaton, Elka Jones, Henry T. Kasper, Jonathan Kelson, T. Alan Lacey, William Lawhorn, Mark Mittelhauser, Kevin M. McCarron, Roger Moncarz, Terry Schau, Lynn Shniper, Patricia Tate, and Ian Wyatt. Editorial work was provided by Edith Baker, Monica Carpio, Monica Gabor, and Douglas Himes, under the supervision of Mary K. Rieg. Word-processing support was provided by Monique Smith and Beverly A. Williams. Computer-programming support was provided by David S. Frank and Erik A. Savisaar. Cover and other artwork (for the original book) were designed by Keith Tapscott.

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About This Book

Helpful Career Planning Information on 42 Major Industries Employing 75 Percent of the Workforce

Most people, when planning their careers, think mainly about the job they want and the education or training needed to get it. Unfortunately, they often overlook the enormous importance of the industry where they work. This book is designed to help.

The *Career Guide to America's Top Industries* provides information on employment trends and opportunities in industries. It is a companion to another book, also published by the U.S. Department of Labor, titled the *Occupational Outlook Handbook* (OOH). These books fulfill a Department of Labor mission to provide useful information for career planning and job seeking.

While the OOH provides information on jobs, the *Career Guide to America's Top Industries* gives details on the industries where people hold these jobs. JIST suggests you use both of these important references in your career planning.

***Career Guide to America's Top Industries* Is Easy to Use!**

This book was developed to assist you in making good career decisions. The information is presented in a readable and useful format. Use the table of contents to identify industries that interest you, and then find out more about them by turning to the page where each industry is described. You can also get a good overview on major employment trends by reading the short section titled "Major Trends in Industries and Employment."



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Summary of Major Sections

Information Provided in the *Career Guide to America's Top Industries*: A quick review of the elements included in each industry description in this book. *Begins on page v.*

Major Trends in Industries and Employment: An excellent (and short!) overview of trends within related groupings of industries and jobs. *Begins on page 1.*

The Industry Descriptions: This is the major section of the book, providing detailed descriptions of 42 industries that employ about 75 percent of the workforce. Use the following list titled "Industries Described in This Book" to locate industries that interest you. Learn more about those industries by reading their descriptions on the pages indicated. *Begins on page 9.*

Sources of State and Local Labor Market and Career Information: State-by-state sources of additional information, including Web site addresses. *Begins on page 259.*

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Information Provided in the *Career Guide to America's Top Industries*

What kinds of workers are employed by a particular industry, and what jobs are you qualified for right now? What jobs require special education or training? And what advancement opportunities do these jobs offer in the long run? The *Career Guide to America's Top Industries* addresses these questions and more for 42 diverse industries which, when combined, accounted for about 3 out of 4 wage and salary jobs in 2002.

As a companion to the *Occupational Outlook Handbook (OOH)*, the *Career Guide to America's Top Industries* discusses careers from an industry perspective. Why? Because many career-minded people think in terms of industries rather than occupations. Your personal circumstances or choice of lifestyle may compel you to remain in a specific area, limiting prospective jobs to those offered by the distinctive mix of industries in your state or community. Or you may be attracted to a particular industry for other reasons—the potential for high earnings in the securities and commodities industry, the appeal of using advanced technology in aerospace manufacturing, or the opportunity to work with children offered by the educational services industry. By focusing on industries, the *Career Guide to America's Top Industries* provides information that the *OOH* does not. It shows the relationships between different occupations and how they cooperate within industries to produce goods and bring them to the market or provide services to businesses and the public. Furthermore, some occupations are unique to a particular industry and are not discussed in the *OOH*. And some industries offer specific paths of career advancement that are not addressed in the *OOH*.

For each industry, the *Career Guide to America's Top Industries* includes a section with information on each of the following topics, although the information presented within each section varies slightly from industry to industry:

Industry Title

This is the name the industry is most commonly called.

NAICS Number

The numbers in parentheses that appear to the right of each industry title are North American Industry Classification System (NAICS) codes that define the economic activities covered by each industry in the *Career Guide to America's Top Industries*. These codes are from the 2002 edition of the *North American Industry Classification System Manual*, a publication of the U.S. Office of Management and Budget that defines and names industries and establishes a structure for relating industries to one another. All statistics on industries produced by the federal government are collected in accordance with the NAICS. The *NAICS Manual* describes the establishment types and goods and services produced in each of the specific industries covered in the *Career Guide to America's Top Industries*. Readers interested in obtaining more detailed definitions of the industries in the *Career Guide to America's Top Industries* should consult the *NAICS Manual*, which is available in the reference section of many libraries. The *NAICS Manual* also may be consulted on the Internet at <http://www.census.gov/epcd/www/naics.html>. This edition of the *Career Guide to America's Top Industries* is the first to be classified according to NAICS. Prior editions classified industries according to the Standard Industrial Classification (SIC), which is no longer being used by federal statistical programs.

Significant Points

One or more key information items are presented at the beginning of each industry description.

Nature of the Industry

- Describes the goods produced or the services provided by the individual segments of each industry.

- Describes the production processes, and the changes in technology or business practices taking place.

Working Conditions

- Describes the physical environment in which workers perform their duties, including the hours of work, the frequency of night or week-end work or split shifts, and the physical activities essential to successful job performance.
- Discusses the proportion of part-time workers, rates of job-related injury and illness, and the extent and frequency of travel.

Employment

- Indicates the number of wage and salary jobs and, where significant, the number of self-employed persons in the industry and data on the age of workers.
- Includes the number of establishments and concentration of industry employment by state, as well as the distribution of establishments and employment in the industry by employment-size class.
- Includes data on other unusual characteristics of industry workers, where significant.

Occupations in the Industry

- Describes the various jobs and the ways in which each fits into the process of producing goods or delivering services to consumers.
- Provides the current and projected numbers of wage and salary jobs by occupation.

Training and Advancement

- Details the qualifications required for key occupations and the types of formal education and other training that employers prefer.
- Discusses the training and educational paths of career advancement for key occupations.
- Discusses self-employment opportunities, when relevant.

Earnings

- Provides data on the average weekly earnings, earnings of key occupations, and employee benefits.

- Lists the principle unions and the proportion of workers who belong to unions or who are covered by union contracts.

Outlook

- Discusses the projected growth or decline of jobs in the industry and the projected rate of job growth compared with those in the economy as a whole.
- Describes the factors expected to influence employment growth, such as new technology, changing business practices, and demographics.
- May discuss the ease or difficulty of acquiring a job.

Sources of Additional Information

This section includes organizations providing additional information via the Internet or by mail on the industry and its job opportunities. It also lists jobs described in the *Occupational Outlook Handbook* that are typically found in the industry.

Many trade associations, professional societies, unions, industrial organizations, and government agencies provide career information that is valuable to counselors and job seekers. For your convenience, some of these organizations and their Internet addresses are listed at the end of each industry statement. Although these references were carefully compiled, the Bureau of Labor Statistics has neither authority nor facilities for investigating the organizations or the information or publications that are sent in response to a request and cannot guarantee the accuracy of such information. The listing of an organization, therefore, does not constitute in any way an endorsement or recommendation by the Bureau either of the organization and its activities or of the information it supplies. Each organization has sole responsibility for whatever information it issues.

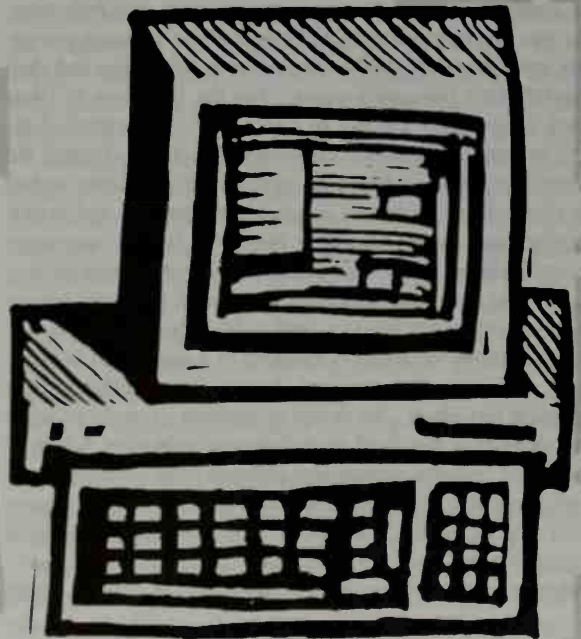
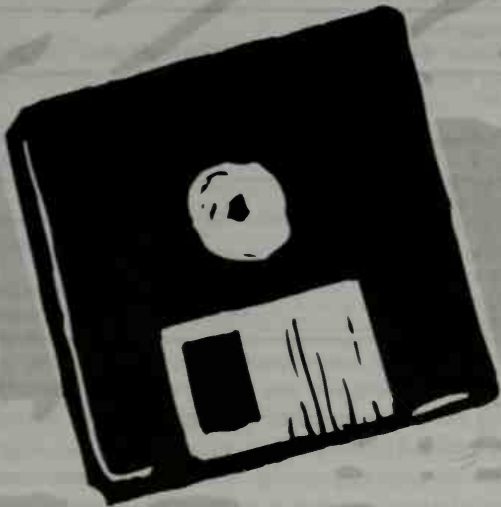
Information Tables

Unless otherwise indicated, the source of data presented in the tables is the Bureau of Labor Statistics.

Major Trends in Industries and Employment

You have many factors to consider in targeting one industry over another when making job and career choices. Some industries pay more than others, are growing more rapidly, have more openings, fit your interests better, or have other advantages.

This section will give you a quick overview of the major employment trends in various occupations and industries in the U.S. economy.



The U.S. economy is comprised of industries with diverse characteristics. For each industry covered in the *Career Guide*, detailed information is provided about specific characteristics: The nature of the industry, working conditions, employment, occupational composition, training and advancement requirements, earnings, and job outlook. This chapter provides an overview of these characteristics and the outlook for the various industries and economy as a whole.

Nature of the Industry

Industries are defined by the processes they use to produce goods and services. Workers in the United States produce and provide a wide variety of products and services and as a result, the types of industries in the U.S. economy range widely—from agriculture, forestry, and fishing to aerospace manufacturing. Although many of these industries are related, each industry has a unique combination of occupations, production techniques, inputs and outputs, and business characteristics. Understanding the nature of the industry is important, because it is this unique combination that determines working conditions, educational requirements, and the job outlook for each of the industries discussed in the *Career Guide*.

Industries consist of many different places of work, called *establishments*, which range from large factories and office complexes employing thousands of workers to small businesses employing only a few workers. Not to be confused with companies, which are legal entities, establishments are physical locations in which people work, such as the branch office of a bank. Thus, a company may have more than one establishment. Establishments that use the same or similar processes to produce goods or services are organized together into *industries*. Industries are, in turn, organized together into *industry groups*. These are further organized into industry subsectors and then ultimately into *industry sectors*. For the purposes of labor market analysis, the Bureau of Labor Statistics organized industry sectors into *industry supersectors* and then divided the supersectors into two broad groups: *Goods-producing industries* (natural resources and mining; construction; and manufacturing) and *service-providing industries* (trade, transportation, and utilities; information; financial activities; professional and business services; education and health services; leisure and hospitality; other services; and public administration).

Each industry subsector is made up of a number of industry groups, which are, as mentioned, determined by differences in production processes. An easily recognized example of these distinctions is in the food manufacturing subsector, which is made up of industry groups that produce meat products, preserved fruits and vegetables, bakery items, and dairy products, among others. Each of these industry groups requires workers with varying skills and employs unique production techniques. Another example of these distinctions is found in utilities, which

employs workers in establishments that provide electricity, natural gas, and water.

There were almost 7.8 million private business establishments in the United States in 2002. The average size of these establishments varies widely across industries.

Most establishments in the construction, wholesale trade, retail trade, finance and insurance, real estate and rental and leasing, and professional, scientific, and technical services industries are small, averaging fewer than 15 employees per establishment. However, wide differences within industries can exist. Hospitals, for example, employ an average of 712.4 workers, while physicians' offices employ an average of 9.3. Similarly, although there is an average of 13.3 employees per establishment for all of retail trade, department stores employ an average of 166.5 people.

Business establishments in the United States are predominantly small; 59.6 percent of all establishments employed fewer than 5 workers in 2002. However, the medium-sized to large establishments employ a greater proportion of all workers. For example, establishments that employed 50 or more workers accounted for only 4.7 percent of all establishments, yet employed 57.4 percent of all workers. The large establishments—those with more than 500 workers—accounted for only 0.2 percent of all establishments, but employed 18.2 percent of all workers. Table 1 presents the percent distribution of employment according to establishment size.

Table 1. Percent distribution of establishments and employment in all private industries by establishment size, March 2002

Establishment size (number of workers)	Establishments	Employment
Total	100.0	100.0
1 to 4	59.6	6.6
5 to 9	16.9	8.2
10 to 19	11.1	10.9
20 to 49	7.7	17.0
50 to 99	2.6	13.3
100 to 249	1.5	16.4
250 to 499	0.4	9.5
500 to 999	0.1	7.0
1,000 or more	0.1	11.2

Establishment size can play a role in the characteristics of each job. Large establishments generally offer workers greater occupational mobility and advancement potential, whereas small establishments may provide their employees with broader experience by requiring them to assume a wider range of responsibilities. Also, small establishments are distributed throughout the Nation; every locality has a few small businesses. Large establishments, in contrast, employ more workers and are less common, but they play a much more prominent role in the economies of the areas in which they are located.

Working Conditions

Just as the goods and services produced in each industry are different, working conditions vary significantly among industries. In some industries, the work setting is quiet, temperature-controlled, and virtually hazard free; while other industries are characterized by noisy, uncomfortable, and sometimes dangerous work environments. Some industries require long workweeks and shift work; in many industries, standard 40-hour workweeks are common. Still other industries can be seasonal, requiring long hours during busy periods and abbreviated schedules during slower months. Production processes, establishment size, and the physical location of work usually determine these varying conditions.

One of the most telling indicators of working conditions is an industry's injury and illness rate. Overexertion, being struck by an object, and falls on the same level, are among the most common incidents causing work-related injury or illness. In 2002, approximately 4.7 million nonfatal injuries and illnesses were reported throughout private industry. Among major industry divisions, manufacturing had the highest rate of injury and illness—7.2 cases for every 100 full time workers—while finance, insurance, and real estate had the lowest rate—1.7 cases. About 5,500 work-related fatalities were reported in 2002; the most common events resulting in fatal injuries were transportation incidents, contact with objects and equipment, assaults and violent acts, and falls.

Work schedules are another important reflection of working conditions, and the operational requirements of each industry lead to large differences in hours worked and in part-time versus full-time status. In food services and drinking places, for example, 37.9 percent of employees worked part time in 2002 compared with only 1.3 percent in mining. Table 2 presents industries having relatively high and low percentages of part-time workers.

The low proportion of part-time workers in some manufacturing industries often reflects the continuous nature of the pro-

duction processes that makes it difficult to adapt the volume of production to short-term fluctuations in product demand. Once begun, it is costly to halt these processes; machinery must be tended and materials must be moved continuously. For example, the chemical manufacturing industry produces many different chemical products through controlled chemical reactions. These processes require chemical operators to monitor and adjust the flow of materials into and out of the line of production. Because production may continue 24 hours a day, 7 days a week, under the watchful eyes of chemical operators who work in shifts, full-time workers are more likely to be employed. Retail trade and service industries, on the other hand, have seasonal cycles marked by various events that affect the hours worked, such as school openings or important holidays. During busy times of the year, longer hours are common, whereas slack periods lead to cutbacks in work hours and shorter workweeks. Jobs in these industries are generally appealing to students and others who desire flexible, part-time schedules.

Employment

The total number of jobs in the United States in 2002 was 144 million. This included 11.4 million self-employed workers, 140,000 unpaid workers in family businesses, and 132.3 million wage and salary workers—including primary and secondary job holders. The total number of jobs is projected to increase to 165.3 million by 2012, and wage and salary jobs are projected to account for more than 153.8 million of them.

As shown in table 3, although wage and salary jobs are the vast majority of all jobs, they are not evenly divided among the various industries. The education and health services industry supersector is the largest source of employment, with about 26 million workers in 2002. The trade, transportation, and utilities supersector is next largest, followed by professional and business services, employing 25.5 million and 16 million workers, respectively. Among the industries covered in the *Career Guide*, wage and salary employment ranged from only 122,500 in oil and gas extraction to 12.5 million in educational services. Three industries—educational services, health services, and food services and drinking places—together accounted for 33.5 million jobs, or one quarter of the Nation's wage and salary employment.

Although workers of all ages are employed in each industry, certain industries tend to possess workers of distinct age groups. For the previously mentioned reasons, retail trade employs a relatively high proportion of younger workers to fill part-time and temporary positions. The manufacturing sector, on the other hand, has a relatively high median age because many jobs in the sector require a number of years to learn and perfect specialized skills that do not easily transfer to other firms. Also, manufacturing employment has been declining, providing fewer opportunities for younger workers to get jobs. As a result, one-fourth of the workers in retail trade were 24 years of age or younger in 2002, compared with only 8.4 percent of workers in manufacturing. Table 4 contrasts the age distribution of workers in all industries with the distributions in five very different industries.

Employment in some industries is concentrated in one region of the country. Such industries often are located near a source of raw or unfinished materials upon which the industry relies. For example, oil and gas extraction jobs are concentrated in Texas,

Table 2. Part-time workers as a percent of total employment, selected industries, 2002

Industry	Percent part-time
All industries	15.8
Many part-time workers	
Food services and drinking places	37.9
Grocery stores	30.1
Clothing, accessory, and general merchandise stores	29.2
Child day care services	29.1
Arts, entertainment, and recreation	28.1
Motion picture and video industries	24.8
Social assistance, except child day care	21.8
Educational services	21.1
Few part-time workers	
Chemical manufacturing, except drugs	3.1
Pharmaceutical and medicine manufacturing	3.1
Computer and electronic product manufacturing	2.6
Utilities	2.5
Aerospace product and parts manufacturing	2.1
Motor vehicle and parts manufacturing	1.8
Steel manufacturing	1.8
Mining	1.3

Table 3. Wage and salary employment in industries covered in the *Career Guide*, 2002 and projected change, 2002-12
(Employment in thousands)

Industry	2002		2012		2002-12	
	Employment	Percent distribution	Employment	Percent distribution	Percent change	Employment change
All Industries	132,279	100.0	153,883	100.0	16.3	21,603
Goods-producing industries	23,766	18.0	24,539	15.9	3.2	772
Natural resources and mining	1,728	1.3	1,644	1.1	-4.9	-84
Agriculture, forestry, fishing, and hunting	1,216	0.9	1,192	0.8	-1.9	-24
Oil and gas extraction	123	0.1	88	0.1	-27.8	-34
Mining	212	0.2	180	0.1	-15.0	-32
Construction	6,732	5.1	7,745	5.0	15.1	1,014
Manufacturing	15,307	11.6	15,149	9.8	-1.0	-157
Aerospace product and parts manufacturing	468	0.4	386	0.3	-17.6	-83
Apparel manufacturing	358	0.3	112	0.1	-68.6	-245
Chemical manufacturing, except drugs	636	0.5	530	0.3	-16.7	-106
Computer and electronic product manufacturing	1,521	1.1	1,333	0.9	-12.4	-189
Food manufacturing	1,525	1.2	1,597	1.0	4.7	72
Motor vehicle and parts manufacturing	1,152	0.9	1,181	0.8	2.6	29
Pharmaceutical and medicine manufacturing	293	0.2	361	0.2	23.2	68
Printing	710	0.5	734	0.5	3.3	24
Steel manufacturing	170	0.1	136	0.1	-20.0	-34
Textile mills and products	489	0.4	338	0.2	-31.0	-152
Service-providing industries	108,513	82.0	129,344	84.1	19.2	20,831
Trade, transportation, and utilities	25,493	19.3	29,093	18.9	14.1	3,600
Automobile dealers	1,250	0.9	1,408	0.9	12.6	158
Clothing, accessory, and general merchandise stores	4,129	3.1	4,473	2.9	8.3	344
Grocery stores	2,478	1.9	2,611	1.7	5.4	133
Wholesale trade	5,641	4.3	6,279	4.1	11.3	638
Air transportation	559	0.4	626	0.4	12.0	67
Truck transportation and warehousing	1,853	1.4	2,274	1.5	22.7	422
Utilities	600	0.5	565	0.4	-5.7	-34
Information	3,420	2.6	4,052	2.6	18.5	632
Broadcasting	334	0.3	362	0.2	8.5	28
Motion picture and video industries	360	0.3	472	0.3	31.1	112
Publishing, except software	714	0.5	703	0.5	-1.5	-11
Software publishers	256	0.2	430	0.3	67.9	174
Telecommunications	1,201	0.9	1,281	0.8	6.7	80
Financial activities	5,815	4.4	6,405	4.2	10.1	590
Banking	1,761	1.3	1,873	1.2	6.4	112
Insurance	2,223	1.7	2,391	1.6	7.5	168
Securities, commodities, and other investments	801	0.6	925	0.6	15.5	124
Professional and business services	16,010	12.1	20,876	13.6	30.4	4,866
Advertising and public relations services	442	0.3	525	0.3	18.9	84
Computer systems design and related services	1,163	0.9	1,798	1.2	54.6	635
Employment services	3,249	2.5	5,012	3.3	54.3	1,764
Management, scientific, and technical consulting services	732	0.6	1,137	0.7	55.4	406
Education and health services	26,060	19.7	32,935	21.4	26.4	6,875
Child day care services	734	0.6	1,050	0.7	43.1	316
Educational services	12,527	9.5	15,016	9.8	19.9	2,489
Health services	12,524	9.5	16,025	10.4	28.0	3,501
Social assistance, except child day care	1,269	1.0	1,867	1.2	47.1	597
Leisure and hospitality	11,969	9.0	14,104	9.2	17.8	2,135
Arts, entertainment, and recreation	1,778	1.3	2,275	1.5	28.0	497
Food services and drinking places	8,412	6.4	9,749	6.3	15.9	1,337
Hotels and other accommodations	1,780	1.3	2,080	1.4	16.9	301
Public administration	9,774	7.4	10,582	6.9	8.3	808
Federal Government, excluding the postal service	1,922	1.5	1,972	1.3	2.6	50
State and local government, except education and health	7,851	5.9	8,610	5.6	9.7	759

NOTE: May not add to totals due to omission of industries not covered in the *Career Guide*.

Table 4. Percent distribution of wage and salary workers by age group, selected industries, 2002

Industry	Age group			
	16 to 24	25 to 44	45 to 64	65 and older
All industries	15	48	34	3
Computer systems design and related services	7	68	25	1
Educational services	10	43	44	3
Food services and drinking places	45	39	15	2
Telecommunications	10	58	32	1
Utilities	6	47	45	2

Louisiana, and Oklahoma; many textile mills and products manufacturing jobs are found in North Carolina, South Carolina, and Georgia; and a significant proportion of motor vehicle manufacturing jobs are located in Michigan and Ohio. On the other hand, some industries—such as grocery stores and educational services—have jobs distributed throughout the Nation, reflecting the general population density.

Occupations in the Industry

The occupations found in each industry depend on the types of services provided or goods produced. For example, because construction companies require skilled trades workers to build and renovate buildings, these companies employ large numbers of carpenters, electricians, plumbers, painters, and sheet metal workers. Other occupations common to construction include construction equipment operators and mechanics, installers, and repairers. Retail trade, on the other hand, displays and sells manufactured goods to consumers. As a result, retail trade employs numerous sales clerks and other workers, including more than three-fourths of all cashiers. Table 5 shows the industry sectors and the occupational groups that predominate in each.

Table 5. Industry sectors and their largest occupational group, 2002

Industry sector	Largest occupational group	Percent of industry wage and salary jobs
Agriculture, forestry, fishing, and hunting	Farming, fishing, and forestry occupations	61.1
Mining	Construction and extraction occupations	33.3
Construction	Construction and extraction occupations	66.2
Manufacturing	Production occupations	52.1
Wholesale trade	Sales and related occupations	24.7
Retail trade	Sales and related occupations	52.5
Transportation and warehousing	Transportation and material moving occupations	56.0
Utilities	Installation, maintenance, and repair occupations	25.6
Information	Professional and related occupations	29.1
Finance and insurance	Office and administrative support occupations	51.4
Real estate and rental and leasing	Sales and related occupations	22.7
Professional, scientific, and technical services	Professional and related occupations	42.6
Management of companies and enterprises	Office and administrative support occupations	33.6
Administrative and support and waste management and remediation services	Office and administrative support occupations	23.2
Educational services, private	Professional and related occupations	59.6
Health care and social assistance	Professional and related occupations	42.6
Arts, entertainment, and recreation	Service occupations	57.2
Accommodation and food services	Service occupations	84.0
Government	Professional and related occupations	43.7

The Nation's occupational distribution clearly is influenced by its industrial structure, yet there are many occupations, such as general manager or secretary, that are found in all industries. In fact, some of the largest occupations in the U.S. economy are dispersed across many industries. For example, the office and administrative support occupational group is among the largest in the Nation since nearly every industry relies on administrative support workers. (See table 6.) Other large occupational groups include professional and related occupations, service occupations, management, business, and financial occupations, and sales and related occupations.

Table 6. Total employment and projected change by broad occupational group, 2002-12
(Employment in thousands)

Occupational group	Employment, 2002	Percent change, 2002-12
Total, all occupations	144,014	14.8
Professional and related occupations	27,687	23.3
Service occupations	26,569	20.1
Office and administrative support occupations	23,851	6.8
Management, business, and financial occupations	15,501	15.4
Sales and related occupations	15,260	12.9
Production occupations	11,258	3.2
Transportation and material moving occupations	9,828	13.1
Construction and extraction occupations	7,292	15.0
Installation, maintenance, and repair occupations	5,696	13.6
Farming, fishing, and forestry occupations	1,072	3.3

Training and Advancement

Workers prepare for employment in many ways, but the most fundamental form of job training in the United States is a high school education. Fully 88 percent of the Nation's workforce

possessed a high school diploma or its equivalent in 2002. However, many occupations require more training, so growing numbers of workers pursue additional training or education after high school. In 2002, 28.7 percent of the Nation's workforce reported having completed some college or an associate's degree as their highest level of education, while an additional 28.7 percent continued in their studies and attained a bachelor's or higher degree. In addition to these types of formal education, other sources of qualifying training include formal company-provided training, apprenticeships, informal on-the-job training, correspondence courses, the Armed Forces vocational training, and non-work-related training.

The unique combination of training required to succeed in each industry is determined largely by the industry's production process and the mix of occupations it requires. For example, manufacturing employs many machine operators who generally need little formal education after high school, but sometimes complete considerable on-the-job training. In contrast, educational services employs many types of teachers, most of whom require a bachelor's or higher degree. Training requirements by industry sector are shown in table 7.

Persons with no more than a high school diploma accounted for about 65.4 percent of all workers in agriculture, forestry, fishing, and hunting; 64.7 percent in construction; 63.3 percent in accommodation and food services; 56.9 percent in mining; 52.9 percent in manufacturing; and 52.7 in retail trade. On the other hand, those who had acquired a bachelor's or higher degree

accounted for 61.6 percent of all workers in educational services, private; 60.4 percent in professional, scientific, and technical services; 41.9 percent in finance and insurance; 39.3 percent in information; and 37.8 percent in government.

Education and training also are important factors in the variety of advancement paths found in different industries. Each industry has some unique advancement paths, but workers who complete additional on-the-job training or education generally help their chances of being promoted. In much of the manufacturing sector, for example, production workers who receive training in management and computer skills increase their likelihood of being promoted to supervisory positions. Other factors that impact advancement and that may figure prominently in the industries covered in the *Career Guide* include the size of the establishments, institutionalized career tracks, and the mix of occupations. As a result, persons who seek jobs in particular industries should be aware of how these advancement paths and other factors may later shape their careers.

Earnings

Like other characteristics, earnings differ by industry, the result of a highly complicated process that reflects a number of factors. For example, earnings may vary due to the nature of occupations in the industry, average hours worked, geographical location, workers' average age, educational requirements, industry profits, and union penetration of the workforce. In general, wages are highest in metropolitan areas to compensate for the higher cost of living. Also, as would be expected, industries that employ a large proportion of unskilled minimum-wage or part time workers tend to have lower earnings.

The difference in earnings of all wage and salary workers in computer systems design and related services, which averaged \$1,112 a week in 2002, and those in food service and drinking places, where the weekly average was \$359, provide a good illustration of how various factors can affect earnings. The difference is so large primarily because computer systems design and related services establishments employ more highly skilled, full-time workers, while food service and drinking places employ many lower skilled, part-time workers. In addition, many workers in food service and drinking places are able to supplement their low wages with money they receive as tips, which is not included in the industry wages data. Table 8 highlights the industries with the highest and lowest average weekly earnings.

Employee benefits, once a minor addition to wages and salaries, continue to grow in diversity and cost. In addition to traditional benefits—including paid vacations, life and health insurance, and pensions—many employers now offer various benefits to accommodate the needs of a changing labor force. Such benefits include childcare, employee assistance programs that provide counseling for personal problems, and wellness programs that encourage exercise, stress management, and self-improvement. Benefits vary among occupational groups, full- and part-time workers, public and private sector workers, regions, unionized and nonunionized workers, and small and large establishments. Data indicate that full-time workers and those in medium-sized and large establishments—those with 100 or more workers—receive better benefits than do part-time workers and those in smaller establishments.

Table 7. Percent distribution of workers by highest grade completed or degree received, by industry sector, 2002

Industry sector	High school diploma or less	Some college or associate's degree	Bachelor's or higher degree
All industries	42.5	28.7	28.7
Agriculture, forestry, fishing, and hunting	65.4	21.2	13.4
Mining	57.0	23.5	19.5
Construction	64.7	25.1	10.2
Manufacturing	52.9	25.7	21.4
Wholesale trade	44.8	27.9	27.3
Retail trade	52.7	31.1	16.1
Transportation and warehousing	52.9	32.1	15.1
Utilities	39.8	35.3	25.0
Information	27.6	33.0	39.3
Finance and insurance	26.1	32.0	41.9
Real estate and rental and leasing	38.9	31.5	29.6
Professional, scientific, and technical services	15.3	24.3	60.4
Administrative and support and waste management and remediation services	54.9	27.3	17.9
Educational services, private	18.9	19.5	61.6
Health care and social assistance	31.9	34.4	33.7
Arts, entertainment, and recreation	41.4	30.7	27.8
Accommodation and food services	63.3	26.4	10.3
Government	25.6	36.7	37.8

Table 8. Average weekly earnings of production or nonsupervisory workers on private nonfarm payrolls, selected industries, 2002

Industry	Earnings
All industries	\$610
Industries with high earnings	
Computer systems design and related services	1,112
Management, scientific, and technical consulting services	992
Securities, commodities, and other investments	971
Aerospace product and parts manufacturing	952
Pharmaceutical and medicine manufacturing	940
Software publishers	921
Computer and electronic product manufacturing	859
Telecommunications	836
Industries with low earnings	
Textile mills and products	446
Grocery stores	424
Clothing, accessory, and general merchandise stores	418
Hotels and other accommodations	410
Agriculture, forestry, fishing, and hunting	376
Food services and drinking places	359
Apparel manufacturing	348
Child day care services	348

Union penetration of the workforce varies widely by industry, and it also may play a role in earnings and benefits. In 2002, about 14.5 percent of workers throughout the Nation were union members or covered by union contracts. As table 9 demonstrates, union affiliation of workers varies widely by industry. Almost 45 percent of the workers in air transportation were union members, the highest rate of all the industries, followed by 38.5 percent in educational services, and 36.9 percent in steel manufacturing. Industries with the lowest unionization rate include software publishers, 0 percent; food services and drinking places, 1.8 percent; and computer systems design and related services, 1.9 percent.

Outlook

Total employment in the United States is projected to increase by about 15 percent over the 2002-12 period. Employment growth, however, is only one source of job openings. The total number of openings in any industry also depends on the industry's current employment level and its need to replace workers who leave their jobs. Throughout the economy, in fact, replacement needs will create more job openings than will employment growth. Employment size is a major determinant of job openings—larger industries generally have larger numbers of workers who must be replaced and provide more openings. The occupational composition of an industry is another factor. Industries with high concentrations of professional, technical, and other jobs that require more formal education—occupations in which workers tend to leave their jobs less frequently—generally have fewer openings resulting from replacement needs. On the other hand, more replacement openings generally occur in industries with high concentrations of service, laborer, and other jobs that re-

quire little formal education and have lower wages because workers in these jobs are more likely to leave their occupations.

Employment growth is determined largely by changes in the demand for the goods and services provided by an industry, worker productivity, and foreign competition. Each industry is affected by a different set of variables that determines the number and composition of jobs that will be available. Even within an industry, employment may grow at different rates in different occupations. For example, changes in technology, production methods, and business practices in an industry might eliminate some jobs, while creating others. Some industries may be growing rapidly overall, yet opportunities for workers in occupations that are adversely affected by technological change could be stagnant or even declining. Similarly, employment of some occupations may be declining in the economy as a whole, yet may be increasing in a rapidly growing industry.

As shown above in table 3, employment growth rates over the next decade will vary widely among industries. Employment in goods-producing industries is expected to increase as growth in construction is partially offset by declining employment in agriculture, forestry, fishing, and hunting; mining; and manufacturing. Growth in construction employment will stem from new factory construction as existing facilities are modernized; from new school construction, reflecting growth in the school-age population; and from infrastructure improvements, such as road and bridge construction. Employment in mining is expected to decline due to laborsaving technology and continued reliance on foreign sources of energy.

Manufacturing employment will decrease slightly—employment declines in apparel manufacturing, computer and electronic product manufacturing, and textile mills and products manufacturing will be partially offset by employment gains in food manufacturing and pharmaceutical and medicine manufacturing. Apparel manufacturing is projected to lose about 245,000 jobs over the 2002-12 period—more than any other manufacturing industry—due primarily to increasing imports replacing domestic products. Employment growth in food manufacturing is expected, as

Table 9. Union members and other workers covered by union contracts as a percent of total employment, selected industries, 2002

Industry	Percent union members or covered by union contract
All industries	14.5
Industries with high unionization rates	
Air transportation	44.8
Educational services	38.5
Steel manufacturing	36.9
Government	35.2
Motor vehicle and parts manufacturing	32.3
Industries with low unionization rates	
Banking	2.1
Advertising and public relations services	2.0
Computer systems design and related services	1.9
Food services and drinking places	1.8
Software publishers	0.0

a growing and ever more diverse population increase the demand for manufactured food products. Employment growth in pharmaceutical and medicine manufacturing is expected, as sales of pharmaceuticals increase with growth in the population, particularly among the elderly, and with the introduction of new medicines to the market. Both food and pharmaceutical and medicine manufacturing also have growing export markets.

Growth in overall employment will result primarily from growth in service-providing industries over the 2002-12 period, almost all of which are expected to have increasing employment. Rising employment in service-providing industries is expected to occur predominately in health services and educational services—the two largest industries discussed in the *Career Guide*—as well as in employment services, food services and drinking places, state and local government, and wholesale trade. When combined, these sectors will account for almost half of all new wage and salary jobs across the Nation.

Health services will account for the most new wage and salary jobs, about 3.5 million over the 2002-12 period. Population growth, advances in medical technologies that increase the number of treatable diseases, and a growing share of the population in older age groups will drive employment growth. Offices of physicians, the largest health services industry group, is expected to account for about 770,000 of these new jobs as patients seek more healthcare outside of the traditional inpatient hospital setting.

Educational services is expected to grow by nearly 20 percent over the 2002-12 period, adding about 2.5 million new jobs. A growing emphasis on improving education and making it available to more children and young adults will be the primary factors contributing to employment growth. Employment growth at all levels of education is expected, particularly at the postsecondary level, as children of the baby boomers continue to reach college age, and as more adults pursue continuing education to enhance or update their skills.

Employment in one of the Nation's fastest growing industries—employment services—is expected to increase by more than 50 percent, adding another 1.8 million jobs over the 2002-12

period. Employment will increase, particularly in temporary help services and professional employer organizations, as businesses seek new ways to make their workforces more specialized and responsive to changes in demand.

The food services and drinking places industry is expected to add more than 1.3 million new jobs over the 2002-12 projection period. Increases in population, dual-income families, and dining sophistication will contribute to job growth. In addition, the increasing diversity of the population will contribute to job growth in food service and drinking places that offer a wider variety of ethnic foods and drinks.

Almost 760,000 new jobs are expected to arise in State and local government, adding almost 10 percent over the 2002-12 period. Job growth will result primarily from growth in the population and its demand for public services. Additional job growth will result as State and local governments continue to receive greater responsibility for administering federally funded programs from the Federal Government.

Wholesale trade is expected to add almost 640,000 new jobs over the coming decade, reflecting growth both in trade and in the overall economy. Most new jobs will be in durable goods merchant wholesalers, such as professional and commercial equipment and supplies; electrical and electronic goods; and furniture and home furnishing. However, industry consolidation and the growth of electronic commerce using the Internet are expected to limit job growth to 11 percent over the 2002-12 period, less than the 15 percent projected for all industries.

Continual changes in the economy have far-reaching and complex effects on employment in each of the industries covered in the *Career Guide*. Jobseekers should be aware of these changes, keeping alert for developments that can affect job opportunities in industries and the variety of occupations that are found in each industry. For more detailed information on specific occupations, consult the 2004-05 edition of the *Occupational Outlook Handbook*, which provides information on more than 275 occupations.

The Industry Descriptions

This is the book's major part, which describes 42 major industries. Look in the table of contents for a complete list of the industries, arranged into these ten clusters:

- Agriculture, Mining, and Construction
- Manufacturing
- Trade
- Transportation and Utilities
- Information
- Financial Activities
- Professional and Business Services
- Education and Health Services
- Leisure and Hospitality
- Government

Agriculture, Mining, and Construction



Agriculture, Forestry, and Fishing

(NAICS 11)

SIGNIFICANT POINTS

- Small family farms constitute 91 percent of all farms and own about two-thirds of all farmland, but large family and commercial farms account for over half of the total value of agricultural production.
- Self-employed workers—mostly farmers and fishers—account for half of the industry's workforce.
- Employment in agriculture, forestry, and fishing is projected to decline, especially among self-employed farmers and ranchers.

Nature of the Industry

The agriculture, forestry, and fishing industry plays a vital role in our economy and our lives. It supplies us and many other countries with a wide variety of food products and non-food products such as fibers, lumber, and nursery items. It contributes positively to our foreign trade balance and it remains one of the Nation's top industries in terms of total employment. However, technology continues to enable us to produce more of these products with fewer workers, even in the face of stagnant prices for output, resulting in fewer farms and farmworkers.

Establishments in this industry include farms, ranches, dairies, greenhouses, nurseries, orchards, and hatcheries. But production also takes place in the country's natural habitats and on government-owned lands and waterways, as in the case of logging and fishing. The vast majority of farms, ranches, and fishing companies are small enterprises, owned and operated by families as their primary or secondary source of income. Although large family farms (those generating more than \$250,000 per year in gross annual sales) and corporate farms comprise less than 10 percent of the establishments in the industry, they produce over half of all agricultural output. Increasingly, these large farms are being operated for the benefit of large agribusiness firms, which buy most of the product.

The agriculture sector of this industry is divided into two major segments, *animal production* and *crop production*. Animal production includes establishments that raise livestock, such as beef cattle, sheep, and hogs; dairy farms; poultry and egg farms; and animal specialty farms, such as apiaries (bee farms) and aquaculture (fish farms). Crop production includes the growing of grains, such as wheat, corn, and barley; field crops, such as cotton and tobacco; vegetables and melons; fruits and nuts; and horticultural specialties, such as flowers and ornamental plants. Of course, many farms have both crops and livestock, such as those that grow their own animal feed, or have diverse enterprises.

Production of some types of crops and livestock tends to be concentrated in particular regions of the country, on the basis of growing conditions and topography. For example, the warm climates of Florida, California, and Arizona are well suited for citrus fruit production. The Southern States are the major growers of tobacco, cotton, rice, and peanuts, while the Northeast, from

Maine to New Jersey, produces blueberries, maple syrup, and apples. Cranberry bogs are found mainly in Wisconsin, Massachusetts, and New Jersey. Hogs, grains, potatoes, and range-fed cattle are major products in the Plains States, where cattle feedlots also are numerous. In the Southwest and West, ranchers raise beef cattle. In Washington State, apples are an important crop. In California, most vegetables and fruits are prominent, as well as grapes for wine. Poultry and dairy farms tend to be found in most areas of the country.

The nature of agricultural work varies, depending on the crop grown, animals being raised and the size of the farm. Although much of the work is now highly mechanized, large numbers of people still are needed to plant and harvest some crops on the larger farms. During the planting, growing, and harvesting seasons, farmers and employed workers are busy for long hours, plowing, disking, harrowing, seeding, fertilizing, and harvesting. Vegetables generally are still harvested manually by groups of migrant farmworkers, although new machines have been developed to replace manual labor for some fruit crops. Vegetable growers on large farms of approximately 100 acres or more usually practice "monoculture," large-scale cultivation of one crop on each division of land. Fieldwork on large grain farms—consisting of hundreds, sometimes thousands, of acres—often is done using massive, climate-controlled tractors and other modern agricultural equipment. In some cases, teams of operators with tractors, combines, or other agricultural equipment travel from one farm to another during harvest time in a practice known as "custom harvesting."

Workers on farms that raise other products, particularly those raising animals, have work that must be done all year long. On dairy farms, for example, the cows must be milked and fed every day and their stalls cleaned. Cows may then be taken outside for exercise and grazing. Dairy workers also may plant, harvest, and store crops such as corn or hay to feed the cattle through the cold of winter or the drought of summer.

Though the nature of the work on large livestock ranches in the West and Southwest still entails the kind of activities—such as branding and herding—often seen in western movies, the use of modern equipment and technology has changed the way the work is done. Branding and vaccinating of herds, for example, are largely mechanized; and the use of trucks, portable communi-

cations gear, and geopositioning equipment now is common and saves valuable time for ranchers. The work on such establishments still tends to be seasonal and to take place largely outdoors. Common activities include raising feed crops, rotating cattle from one pasture to another, and keeping fences in good repair.

Most poultry and egg farms are large operations resembling production lines. Although free-range farms allow fowl some time outside during the day for exercise and sunlight, most poultry production involves mainly indoor work, with workers repeatedly performing a limited number of specific tasks. Because of increased mechanization, poultry growers can raise chickens by the thousands—sometimes by the hundreds of thousands—under one roof. Eggs still are collected manually in some small-scale hatcheries, but, in larger hatcheries, eggs tumble down onto conveyor belts. Machines then wash, sort, and pack the eggs into individual cartons. Workers place the cartons into boxes and stack the boxes onto pallets for shipment.

Aquaculture farmers raise fish and shellfish in salt, brackish, or fresh water—depending on the requirements of the particular species. Farms usually use ponds, floating net pens, raceways, or recirculating systems, but larger fish farms are actually in the sea, relatively close to shore. Workers on aquaculture farms stock, feed, protect, and otherwise manage aquatic life to be sold for consumption or used for recreational fishing.

Horticulture farms raise ornamental plants, bulbs, shrubbery, sod, and flowers. Although much of the work takes place outdoors, in climates with cold seasons, substantial production also takes place in greenhouses or hothouses. On such farms, the work can be year-round.

Although most agricultural establishments sell their products to food processing, textile, and food retailing companies, some cater directly to the public. For example, some fruit and vegetable growers use the marketing strategy of “pick-your-own” produce, set up roadside stands, or sell at farmers’ markets. Nurseries and greenhouses, which grow everything from flowers to tree seedlings, provide products to lawn and garden centers as well as to retail establishments, landscaping contractors, and other businesses; some also sell directly to individual consumers.

Workers employed in the forestry and logging sector grow and harvest timber on a long production cycle of 10 years or more, and specialize in different stages of the production cycle. Those engaged in reforestation produce seedlings in specialized nurseries. Workers in timber production remove diseased or damaged trees from timber land, as well brush and debris that could pose a fire hazard. Besides commercial timber land, they may also work in natural forests or other suitable areas of land that remain available for production over a long duration. Logging workers harvest the timber in order for it to become lumber for construction, wood products, or paper products. They cut down the trees, remove their tops and branches, and cut their trunks into logs of specified length. They usually use a variety of specialized machinery to move the logs to loading areas and load them on trucks for transport to papermills and sawmills.

People employed in fishing harvest fish and shellfish from their natural habitat in fresh water and in tidal areas and the ocean, and depend for their livelihood on a naturally replenishing sup-

ply of fish, lobster, shellfish, or other edible marine life. Some full-time and many part-time fishers work on small boats in relatively shallow waters, often in sight of land. Crews are small—usually only one or two people collaborate on all aspects of the fishing operation. Others fish hundreds of miles offshore on large commercial fishing vessels. Navigation and communication are essential for safety of all of those who work on the water, but particularly for those who work far from shore. Large boats, capable of hauling a catch of tens of thousands of pounds of fish, require a crew that includes a captain, or “skipper,” a first mate and sometimes a second mate, a boatswain (called a deckboss on some smaller boats), and deckhands to operate the fishing gear, sort and load the catch when it is brought to the deck, and aid in the general operation of the vessel.

Working Conditions

Agriculture, forestry, and fishing attract people who enjoy working with animals, living an independent lifestyle, or working outdoors on the land. For many, the wide-open physical expanse, the variability of day-to-day work, and the rural setting provide benefits that offset the sometimes hard labor, the danger and the risks associated with unseasonable or extreme weather or unfavorable commodity prices.

Although the working conditions vary by occupation and setting, there are some characteristics common to most agriculture, forestry and fishing jobs. Work hours generally vary and the jobs often require longer than an 8-hour day and a 5-day, 40-hour week; work cannot be delayed when crops must be planted and harvested, or when animals must be sheltered and fed. Weekend work is common, and farmers, agricultural managers, crew leaders, farm-equipment operators, and agricultural workers may work a 6- or 7-day week during planting and harvesting seasons. Graders and sorters may work evenings or weekends because of the perishable nature of the products. Almost 1 out of 4 employees in this industry work variable schedules, compared with fewer than 1 in 10 workers in all industries combined. Because much of the work is seasonal in nature, many farmworkers must cope with periods of unemployment or obtain short-term jobs in other industries when the farms have no work. Migrant farmworkers, who move from location to location to harvest crops as they ripen, live an unsettled lifestyle, which can be stressful.

Much of the work on farms and ranches takes place outdoors, in all kinds of weather, and is physical in nature. Harvesting some types of vegetables, for example, requires manual labor and workers do a lot of bending, stooping, and lifting. Living conditions are often modest, although there are regulations to assure minimum standards. The year-round nature of much livestock production work means that ranch workers must be out in the heat of summer, as well as the cold of winter. Those who work directly with animals risk being bitten or kicked.

Farmers, farm managers, and agricultural workers in crop production risk exposure to pesticides and other potentially hazardous chemicals that are sprayed on crops or plants. Those who work on mechanized farms must take precautions when working with tools and heavy equipment in order to avoid injury.

Forestry and logging jobs are physically demanding and often dangerous, although machinery has eliminated some of the heavy labor. Most logging occupations involve lifting, climb-

ing, and other strenuous activities. Loggers work under unusually hazardous conditions. Falling trees and branches are a constant menace, as are the dangers associated with log-handling operations and the use of sawing equipment, especially delimbing devices. Special care must be taken during strong winds, which can even halt operations. Slippery or muddy ground and hidden roots or vines not only reduce efficiency but also present a constant danger, especially in the presence of moving vehicles and machinery. Workers may encounter poisonous plants, brambles, insects, snakes, and heat and humidity. If safety precautions are not taken, the high noise level of sawing and skidding operations over long periods may impair hearing. If workers are to avoid injury, their experience, exercise of caution, and use of proper safety measures and equipment—such as hardhats, eye and ear protection, and safety clothing and boots—are extremely important.

Logging sites are often far from population centers and require long commutes. Some lumber companies set up bunkhouses or camps for employees to stay in overnight.

Fishing operations are conducted under various environmental conditions, depending on the region of the country and the kind of species sought. Storms, fog, and wind may hamper the work of fishing vessels. People employed in fishing work under conditions that can quickly turn from pleasant to wet and hazardous, and help is often not readily available. Work must be performed on decks that are wet and slippery as the result of fish processing operations or ice formation in the winter. Workers must be constantly on guard against entanglement in fishing nets and gear, sudden breakage or malfunction of fishing gear, or being swept overboard. Malfunctioning navigation or communication equipment may lead to collisions with underwater hazards or other vessels and even shipwrecks. Also, when injuries occur, medical treatment beyond simple first aid usually is not available until the vessel can reach port.

Most workers employed in fishing return to their homes every evening. However, workers on vessels that range far from port may be at sea for days or even weeks. While newer vessels of this type have improved living quarters and amenities, such as television and shower stalls, crews still experience the aggravations of confined conditions, continuous close personal contact, and the absence of family.

Some component industries making up agriculture, forestry, and fishing have some of the highest incidences of illnesses and injuries of any industry. In 2002, the overall industry had 6.4 injuries and illnesses per 100 full-time workers, compared with an average of 5.3 throughout private industry. Those working with livestock had significantly higher incidences of work-related illness and injury than those working with crops.

Employment

In 2002, agriculture, forestry, and fishing employed a total of about 2.2 million workers including self-employed and unpaid family workers, making it one of the largest industries in the Nation. This industry is unusual in that self-employed and unpaid family workers account for almost 46 percent of its workforce. The vast majority of these workers—about 2 million—were employed in the agricultural products subsector of this industry. Among all workers in agriculture, forestry and fish-

ing industry, more than 1.2 million were wage and salary workers (See table 1), while slightly more than 1 million were self-employed and unpaid family workers.

Table 1. Distribution of wage and salary employment in agriculture, forestry, and fishing by detailed industry, 2002
(Employment in thousands)

Industry	Employment	Percent
Total, all industries	1,216	100.0
Crop production	570	46.9
Animal production	440	36.2
Logging	69	5.7
Fishing, hunting and trapping	30	2.5
Forestry	10	0.8
Support activities for agriculture and forestry	97	8.0

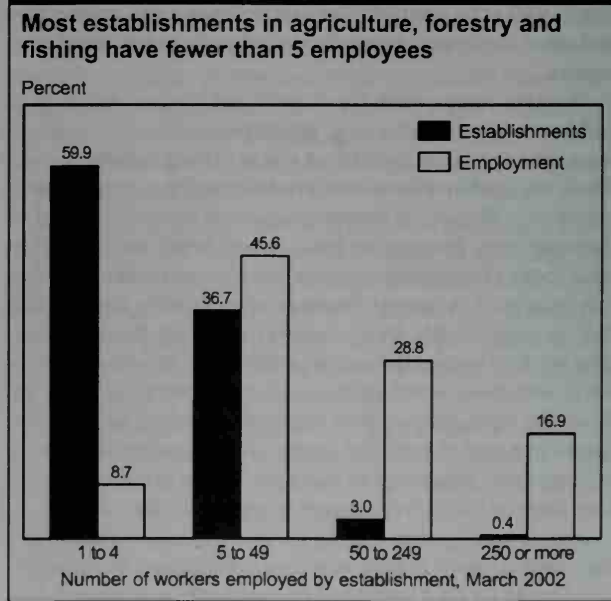
Agriculture, forestry, and fishing is one of the few remaining areas of the economy in which unpaid family workers remain a significant part of the workforce. Most unpaid family workers assist with the farmwork or fishing, but a small number do bookkeeping, purchase supplies, or arrange the sale of crops, livestock, or the daily catch.

Most individual agricultural-production establishments employ fewer than 5 workers (chart).

Workers in agriculture, forestry, and fishing tend to be older than workers in other industries. In 2002, 50 percent of workers were aged 45 or older, compared with about 38 percent of all workers in all industries.

Occupations in the Industry

Agriculture, forestry, and fishing employs many occupational specialties—from bookkeepers, accountants, and auditors to mechanics and repairers (table 2). Among the industry's wage and salary workers, the single most common occupation was that of



farmworkers, who made up nearly 43 percent of the overall workforce. The majority of self-employed workers were farmers and ranchers, but many also worked as fishers. Along with farm managers, farmworkers, farmers, and ranchers comprise the overwhelming majority of workers.

Farmers and ranchers are the self-employed owner-operators of establishments that produce agricultural output. Their work encompasses numerous tasks, both production-related and management-related. Along with planting, cultivating, harvesting their crops and feeding and raising their livestock, farmers and ranchers must perform numerous bookkeeping activities. They keep records of their animals' health, crop rotation, operating expenses, major purchases, bills paid, and income due, as well as pay bills and file taxes. If the farm or ranch has paid employees, its owner or operator may keep in order all of the paperwork needed to satisfy legal requirements, including payroll records and State and Federal tax records. Computer literacy has become as necessary for farmers as it has for many other occupations. Farmers also hire, train, and manage the schedules and supervise the work of farmworkers or farm labor contractors. They assign, monitor, and assess individuals' work day in and day out.

Farmers and ranchers must have additional skills to keep a farm or ranch operating. Basic understanding and working knowledge of mechanics, carpentry, plumbing, and electricity are helpful, if not essential, for running an agricultural establishment. Increasingly, farmers are becoming more involved in marketing, too, especially in "direct marketing" where they sell their products directly to the consumer.

Farmers who work large farms make decisions as much as a year in advance about which crop to grow. Therefore, a farmer must be aware of commodity prices in national and international markets to use for guidance, while tracking the costs associated with each particular crop. When dealing in hundreds or thousands of acres of one crop, even small errors in judgment are magnified, so the impact can be substantial. Thus, large-scale farmers strive to keep costs to a minimum in every phase of the operation. Furthermore, risk management of portfolios—the practice of juggling stocks, buying and selling futures, and engaging in other paper deals such as bond trading—is now becoming more important for owner-operators of large commercial farms.

Farm, ranch, and other agricultural managers operate farms, ranches, nurseries, timber tracts, and aquaculture operations on a daily basis for the owners. Agricultural managers perform many of the same tasks as do farmers and ranchers. Large commercial farms may have a manager for different operations within the establishment. On smaller farms, one manager may oversee all operations. Managers are responsible for purchasing machinery, seed, fertilizers, herbicides and pesticides, fuel, and labor. They must be aware of any laws that govern the use of such inputs in the farm's locality. Agricultural managers must be knowledgeable about crop rotation, soil testing, and various types of capital improvements necessary to maximize crop yields.

Agricultural workers include occupations that perform a whole spectrum of daily chores involved in crop and livestock production. *Graders and sorters* ensure the quality of the agricultural commodities that reach the market. They grade, sort, or

classify unprocessed food and other agricultural products by size, weight, color, or condition. *Farmworkers and laborers, crop, nursery, and greenhouse* manually plant, maintain, and harvest food crops; apply pesticides, herbicides, and fertilizer to crops; and cultivate plants used to beautify landscapes. They prepare nursery acreage or greenhouse beds for planting; water, weed, and spray trees, shrubs, and plants; cut, roll, and stack sod; stake trees; tie, wrap, and pack flowers, plants, shrubs, and trees to fill orders; and dig up or move field-grown and containerized shrubs and trees. Additional duties include planting seedlings, transplanting saplings, and watering and trimming plants.

Farmworkers, farm and ranch animals care for farm, ranch, or aquaculture animals that may include cattle, sheep, swine, goats, horses, poultry, finfish, shellfish, and bees. They also tend to animals raised for animal products, such as meat, fur, skins, feathers, eggs, milk, and honey. Duties may include feeding, watering, herding, grazing, castrating, branding, debeaking, weighing, catching, and loading animals. These farmworkers also may maintain records on animals, examine animals to detect diseases and injuries, and assist in birth deliveries and administer medications, vaccinations, or insecticides, as appropriate. Daily duties include cleaning and maintaining animal housing areas. These workers also may repair farm buildings and fences and haul livestock products to market. On dairy farms, they may operate milking machines and other dairy-processing equipment.

Forest and conservation workers perform a variety of tasks to reforest and conserve timber lands and maintain forest facilities, such as roads and campsites. They may plant tree seedlings to reforest timber land areas, remove diseased or undesirable trees, and spray trees with insecticides. They also may clear away brush and debris from trails, roadsides, and camping areas. Other forest and conservation workers work in forest nurseries, sorting out tree seedlings and discarding those that do not meet prescribed standards of root formation, stem development, and foliage condition.

Foresters manage forested lands for economic, recreational, and conservation purposes. They inventory the type, amount, and location of standing timber, determine the timber's worth, negotiate with purchasers for the timber, and draw up contracts for tree removal and procurement. Foresters determine how to conserve wildlife habitats, creekbeds, water quality, and soil stability, and how best to comply with environmental regulations. They also devise plans for planting and growing trees, monitor the trees' growth, and determine the best time for harvesting.

Forest and conservation technicians, under the direction of foresters, compile data on the size, content, and condition of forest land tracts. These workers travel through sections of forest to gather basic information, such as species and population of trees, disease and insect damage, tree seedling mortality, and conditions that may cause fire danger. Forest and conservation technicians also train and lead forest and conservation workers in seasonal activities, such as planting tree seedlings, putting out forest fires, and maintaining recreational facilities.

Fishers and related fishing workers use nets, fishing rods, or other equipment to catch and trap various types of marine life for human consumption, animal feed, bait, and other uses. Fishing boat captains plan and oversee fishing operations—the fish to be sought, the location of the best fishing grounds, the method of

capture, the duration of the trip, and the sale of the catch. *First mates*—captains' assistants, who must be familiar with navigation requirements and the operation of the vessel and all of its electronic equipment—assume control of the vessel when the captain is off duty. *Boatswains*, highly experienced deckhands with supervisory responsibilities, direct the *deckhands* as they carry out the sailing and fishing operations.

Training and Advancement

The agriculture, forestry, and fishing industry is characterized by a large number of workers with relatively low levels of educational attainment. Almost 30 percent of this industry's workforce does not have a high school diploma, compared with only 12 percent of all workers in all industries combined. The proportion of workers without a high school diploma is particularly high in the crop-producing agricultural sector, where there are more labor-intensive establishments employing migrant farmworkers.

Training and education requirements for general farmworkers are few. Some experience in farmwork or ranchwork is beneficial, but most tasks require manual labor and are learned fairly quickly on the job. Advancement for farmworkers is somewhat limited. Motivated and experienced farmworkers may become crew leaders or farm-labor contractors. Because firsthand knowledge of farm produce is good preparation for grading, sorting, and inspecting, some farmworkers may become agricultural graders and sorters or inspectors. Farmworkers who wish to become independent farmers or ranchers first must buy or rent a plot of land, which can be a substantial financial commitment if one buys instead of rents.

Becoming a farmer generally does not require formal training or credentials. However, knowledge of and expertise in agricultural production are essential to success for prospective farmers. The traditional method for acquiring such knowledge is through growing up on a farm, but this background is becoming less and less common as the percentage of the U.S. population raised on farms continues to dwindle. But even with a farming background, a person considering farming would benefit from the formal postsecondary agricultural education offered by land-grant universities in many of the States. Programs usually incorporate hands-on training into the curriculums to complement the academic subjects. Typical coursework covers the agricultural sciences (crop, dairy, and animal) and business subjects such as accounting and marketing. Also, there are some private organizations that help people gain farming skills, particularly if they are interested in more "alternative" types of farming.

Experience and some formal education are necessary for agricultural managers. A bachelor's degree in business with a concentration in agriculture provides a good background. Work experience in the various aspects of farm or ranch operations enhances knowledge and develops decision-making skills, which further qualifies prospective agricultural managers. The experience of having performed tasks on other farming establishments as a farmworker may save managers valuable time in forming daily or monthly work plans and help them to avoid pitfalls that could result in financial burdens for the farm.

Whether it is gained through experience or formal education, both farmers and agricultural managers need enough technical

knowledge of crops, growing conditions, and plant diseases to make sound scientific and business decisions. A rudimentary knowledge of veterinary science, as well as animal husbandry, is important for dairy and livestock farmers, ranchers, and agricultural managers.

Table 2. Employment of wage and salary workers in agriculture, forestry, and fishing by occupation, 2002 and projected change, 2002-2012
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-2012
	Number	Percent	
All occupations	1,216	100.0	-1.9
Management, business, and financial occupations	231	19.0	2.5
Top executives	9	0.7	-18.6
Farm, ranch, and other agricultural managers	193	15.9	6.4
Farmers and ranchers	6	0.5	-22.4
Accountants and auditors	6	0.5	-20.8
Professional and related occupations	25	2.1	-9.1
Biological scientists	4	0.3	-10.3
Conservation scientists and foresters ...	3	0.3	2.4
Agricultural and food science technicians	4	0.3	-2.0
Service occupations	42	3.4	-16.0
Landscaping and groundskeeping workers	11	0.9	-14.4
Animal care and service workers	11	0.9	-8.7
Office and administrative support occupations	62	5.1	-30.9
Bookkeeping, accounting, and auditing clerks	18	1.5	-31.1
Secretaries and administrative assistants	16	1.3	-32.4
Farming, fishing, and forestry occupations	743	61.1	2.4
Supervisors, farming, fishing, and forestry workers	30	2.5	10.4
Animal breeders	4	0.3	11.3
Graders and sorters, agricultural products	14	1.1	9.7
Agricultural equipment operators	48	4.0	8.7
Farmworkers and laborers, crop, nursery, and greenhouse	498	41.0	2.5
Farmworkers, farm and ranch animals	25	2.0	4.1
Fishers and related fishing workers	16	1.3	-30.2
Fallers	9	0.7	-4.6
Logging equipment operators	24	1.9	-3.9
All other farming, fishing, and forestry workers	70	5.8	2.3
Installation, maintenance, and repair occupations	18	1.5	-10.8
Production occupations	19	1.5	-15.4
Transportation and material moving occupations	60	4.9	-17.3
Driver sales workers	5	0.4	-28.9
Truck drivers, heavy and tractor-trailer	28	2.3	-11.2
Laborers and material movers, hand	15	1.3	-26.1

NOTE: May not add to totals due to omission of occupations with small employment.

It also is crucial for farmers, ranchers, and agricultural managers to stay abreast of the latest developments in agricultural production. They may do this by reviewing agricultural journals that publish information about new cost-cutting procedures, new forms of marketing, or improved production using new techniques. County cooperative extension agencies serve as a link between university and government research programs on the one hand, and farmers and farm managers on the other, providing the latest information on numerous agriculture-related subjects. County cooperative extension agents may demonstrate new animal-breeding techniques, or more environmentally safe methods of fertilizing, for example. Other organizations provide information—through journals, newsletters, and the Internet—on agricultural research and the results of implementing innovative methods and ideas.

Some private organizations are helping to make farmland available and affordable for new farmers through a variety of institutional innovations. Land Link programs, coordinated by the National Farm Transition Network, operate in over 20 states. They help match up young farmers with farmers approaching retirement so that arrangements can be made to pass along their land to young farmers wishing to keep the land under cultivation. Often a beginning farmer will rent some or all of his or her farmland. Sometimes, a new farmer will work on a farm for a few years, while the farm owner gradually transfers ownership to the new farmer.

Most forest, conservation, and logging workers develop skills and learn to operate the complex machinery through on-the-job training with instruction coming primarily from experienced workers and the logging companies themselves. Some trade associations also offer special training programs. Safety training is a vital part of instruction for all logging workers.

Many State forestry and logging associations provide training sessions for fallers, whose jobs require more skill and experience than other positions on the logging team. Sessions may take place in the field, where trainees, under the supervision of an experienced logger, have the opportunity to practice various felling techniques. Fallers learn how to manually cut down extremely large or expensive trees safely and with minimal damage to the felled or surrounding trees. They also may receive training in best management practices, safety, endangered species preservation, reforestation, and business management. Some programs lead to logger certification.

Workers in the fishing industry usually acquire occupational skills on the job, many as members of families involved in fishing activities. No formal academic requirements exist. Operators of large commercial fishing vessels are required to complete a Coast Guard-approved training course. Students can expedite their entrance into these occupations by enrolling in 2-year vocational-technical programs offered by secondary schools. In addition, some community colleges and universities offer fishery technology and related programs that include courses in seamanship, vessel operations, marine safety, navigation, vessel repair and maintenance, health emergencies, and fishing gear technology. Courses include hands-on experience. Secondary and postsecondary programs are normally offered in or near coastal areas.

Fishers must be in good health and possess physical strength. Good coordination, mechanical aptitude, and the ability to work under difficult or dangerous conditions are necessary to operate, maintain, and repair equipment and fishing gear. On large vessels, they must be able to work as members of a team. Fishers must be patient, yet always alert, to overcome the boredom of long watches when their vessel is not engaged in fishing operations. The ability to assume any deckhand's functions, on short notice, is important. As supervisors, mates must be able to assume all duties, including the captain's, when necessary. The captain must be highly experienced, mature, and decisive, and possess the business skills needed to run business operations.

On fishing vessels, most workers begin as deckhands. Deckhands who acquire experience and whose interests are in ship engineering—maintenance and repair of ship engines and equipment—can eventually become licensed chief engineers on large commercial vessels, after meeting the Coast Guard's experience, physical, and academic requirements. Experienced, reliable deckhands who display supervisory qualities may become boatswains. Boatswains may, in turn, become second mates, first mates, and, finally, captains. Almost all captains become self-employed, and the overwhelming majority eventually own, or have an interest in, one or more fishing vessels. Some may choose to run a sport or recreational fishing operation. When their sea-going days are over, experienced individuals may work in or, with the necessary capital, own stores selling fishing and marine equipment and supplies.

Earnings

In 2002, median earnings for workers in the agriculture, forestry, and fishing industry were \$376 a week, with a wide range from less than \$226 a week for the lowest 10 percent to more than \$822 a week for the highest 10 percent. Lower than average earnings are due in part to the low level of skill required for many of the jobs in the industry and to the seasonal nature of the work.

Farm income can vary substantially depending on a number of factors, including: The type of crop or livestock being raised, price fluctuations for various agricultural products, and weather conditions that affect yield. In some cases, government subsidies may supplement a farmer's income. For a growing number of farmers and ranchers, particularly those working on farms for residential and lifestyle reasons, crop or livestock production is not their major occupation or source of income.

Outlook

Employment in the agriculture, forestry, and fishing industry is projected to decline 15 percent over the 2002-2012 period. Low agricultural prices and increasing imports of lumber and fish will cause many workers to leave this industry. In addition, fishers face growing restrictions on where they can fish and how much they can harvest because many fisheries (fish habitats) have been depleted due to years of overfishing.

Numerous farms are expected to go out of business over the next decade because prices for many agricultural goods are low, a situation that has many causes. First of all, U.S. farms continue to produce more than is needed to meet domestic and ex-

port requirements. Increasing productivity means that it takes less farm labor to produce crops and livestock than in the past. In addition, market pressures on the family farm will continue to drive consolidation in the industry, as farms become bigger and more likely to be controlled by large corporations. The decline in employment will be fastest, at 31 percent, among self-employed and unpaid family workers, most of whom are farmers and their families. Employment of wage and salary workers is expected to decline by 2 percent compared with 16 percent growth for all industries combined.

Employment on many farms will most likely continue to be characterized by low wages and lack of benefits. Employment of farmers and ranchers is projected to decrease. Employment of agricultural managers, farmworkers, and graders and sorters is projected to rise, but more slowly than the average for all occupations. Prospects should be best for agricultural workers employed by nurseries and greenhouses.

Employment declines, however are being moderated by other changes taking place in agriculture. Employment in aquaculture, for example, has been growing steadily over the past 10 years in response to growth in the demand for fish. Because of low prices for some agricultural commodities, more farmers—including some in the Midwest—are switching to specialty crops or aquaculture production. New developments in the marketing of milk and other agricultural produce through farmer-owned and -operated cooperatives hold promise for some dairy and other farms. Furthermore, demand for organic farm produce—grown mostly on small to medium-sized farms—is growing. Consumers are becoming more wary of the possible effects the pesticides and fertilizers used in conventional agriculture. The production of crops without the use of these chemicals is allowing farms of small acreage—which only 12 years ago appeared to have almost no future as working farms—to remain economically viable.

Also, some Federal, State, and local government programs provide assistance targeted at small farms. For example, some programs allow farmers to sell the development rights to their property to nonprofit organizations pledged to preserving green space. This immediately lowers the market value of the land—and the property taxes levied on it—making farming more affordable.

Prospects for employment in forestry will be below average as the sector moves towards greater mechanization, replacing many lower skilled workers with more machinery tended by a few technicians. In addition, rising imports of wood and wood products are expected to continue. Other countries, particularly Canada, have invested more heavily in their lumber and paper mills than has the United States, and that has enabled them to keep prices low. The best job opportunities will be for those forestry workers with more skills, such as technicians and foresters.

In the fishing sector, increases in imports and efforts to revive fisheries by limiting fishing activity in them will continue to lead to employment declines. Although certain areas of the country, such as Alaska, will continue to harvest massive amounts of fish, and remain relatively prosperous, the Nation's fisheries are a delicate resource. To the extent that they are damaged by such factors as coastal pollution or overfishing, there will be fewer jobs for fishers.

Sources of Additional Information

For general information about farming and agricultural occupations, contact:

- Small Farm Program, U.S. Department of Agriculture, Cooperative State, Research, Education, and Extension Service, Stop 2215, Washington, DC 20250-2215. Internet: <http://www.reesusda.gov/smallfarm>
- Growing New Farmers Consortium, c/o New England Small Farm Institute, P.O. Box 608, Belchertown, MA 01007. Internet: <http://www.northeastnewfarmers.org>

For information about organic farming, horticulture, and internships, contact:

- Appropriate Technology Transfer for Rural Areas, P.O. Box 3657, Fayetteville, AR 72702. Internet: <http://attra.ncat.org>

For information on a wide range of topics in agriculture, contact:

- The National Agricultural Library, 10301 Baltimore Ave., Room 132, Beltsville, MD 20705-2351. Internet: <http://www.nal.usda.gov/services/htm>

For information on a career as a farm manager, contact:

- American Society of Farm Managers and Rural Appraisers, 950 South Cherry St., #508, Denver, CO 80222. Internet: <http://www.asfmra.org>

For information on Land Link Programs, contact:

- The National Farm Transition Network, ISU Extension Outreach Center, 2020 DMACC Boulevard, Ankeny, IA 50021. Internet: <http://www.extension.iastate.edu/nftn/netwpart.html>

For information about State agencies involved in the purchases of development rights of farmland, contact:

- American Farmland Trust, 1200 18th St., NW, Washington, DC 20036. Internet: <http://www.farmland.org>

For information about careers and education resources in agriculture, contact:

- National FFA Organization, The National FFA Center, Attention: Career Information Requests, P.O. Box 68690, Indianapolis, IN 46268-0960. Internet: <http://www.ffa.org>

Information on licensing of fishing vessel captains and mates, and requirements for merchant mariner documentation, is available from the U.S. Coast Guard Marine Inspection Office or Marine Safety Office in your State, or:

- Licensing and Evaluation Branch, National Maritime Center, 4200 Wilson Blvd., Suite 630, Arlington, VA 22203-1804.

Schools of forestry at States' land-grant colleges or universities also should be able to provide useful information.

Information on the following occupations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Farmers, ranchers, and agricultural managers
- Agricultural workers

- Forest, conservation, and logging workers
- Fishers and fishing vessel operators
- Grounds-maintenance workers
- Bookkeeping, accounting, and auditing clerks

SIGNIFICANT POINTS

- Job opportunities are expected to be excellent for experienced workers.
- Workers in construction have relatively high hourly earnings.
- More than 4 out of 5 establishments in the industry employ fewer than 10 people.
- Construction has a very large number of self-employed workers.

Nature of the Industry

Houses, apartments, factories, offices, schools, roads, and bridges are only some of the products of the construction industry. This industry's activities include work on new structures as well as additions, alterations, and repairs to existing ones. (Some government establishments do the same work and employ a significant number of people, but information about them is not included in this statement. Information concerning government construction is included in the statements on Federal Government and State and local government, except education and health, elsewhere in the *Career Guide to Industries*.)

The construction industry is divided into three major segments. *Construction of buildings contractors*, or *general contractors*, build residential, industrial, commercial, and other buildings. *Heavy and civil engineering construction contractors* build sewers, roads, highways, bridges, tunnels, and other projects. *Specialty trade contractors* are engaged in specialized activities such as carpentry, painting, plumbing, and electrical work.

Construction usually is done or coordinated by general contractors, who specialize in one type of construction such as residential or commercial building. They take full responsibility for the complete job, except for specified portions of the work that may be omitted from the general contract. Although general contractors may do a portion of the work with their own crews, they often subcontract most of the work to heavy construction or specialty trade contractors.

Specialty trade contractors usually do the work of only one trade, such as painting, carpentry, or electrical work, or of two or more closely related trades, such as plumbing and heating. Beyond fitting their work to that of the other trades, specialty trade contractors have no responsibility for the structure as a whole. They obtain orders for their work from general contractors, architects, or property owners. Repairwork is almost always done on direct order from owners, occupants, architects, or rental agents.

Working Conditions

Most employees in this industry work full time, and many work over 40 hours a week. In 2002, about 1 in 5 construction workers worked 45 hours or more a week. Construction workers may sometimes work evenings, weekends, and holidays to finish a job or take care of an emergency. Workers in this industry need physical stamina because the work frequently requires prolonged standing, bending, stooping, and working in cramped quarters.

They also may be required to lift and carry heavy objects. Exposure to weather is common because much of the work is done outside or in partially enclosed structures. Construction workers often work with potentially dangerous tools and equipment amidst a clutter of building materials; some work on temporary scaffolding or at great heights and in bad weather. Consequently, they are more prone to injuries than are workers in other jobs. In 2002, cases of work-related injury and illness were 7.1 per 100 full-time construction workers, which is significantly higher than the 5.3 rate for the entire private sector. Workers who do roofing, siding, and sheet metal work experienced the highest injury rates. In response, employers increasingly emphasize safe working conditions and work habits that reduce the risk of injuries. To avoid injury, employees wear safety clothing, such as gloves and hardhats, and sometimes devices to protect their eyes, mouth, or hearing.

Employment

Construction, with 6.7 million wage and salary jobs and 1.6 million self-employed and unpaid family nongovernment jobs in 2002, was one of the Nation's largest industries.

Almost 2 out of 3 wage and salary jobs were with specialty trade contractors, primarily plumbing, electrical, and masonry contractors. Around 1 out of 4 jobs were with building contractors, mostly in residential and nonresidential construction. The rest were with heavy and civil engineering construction contractors (table 1). Employment in this industry is distributed geographically in much the same way as the Nation's population; the concentration of employment is generally in industrialized and heavily populated areas.

There were about 792,000 construction companies in the United States in 2002: 237,000 were building construction contractors; 60,000 were heavy and civil engineering construction or highway contractors; and 496,000 were specialty trade contractors. Most of these establishments tend to be small, the majority employing fewer than 10 workers (chart 1). About 4 out of 5 workers are employed by these small contractors.

Construction offers more opportunities than most other industries for individuals who want to own and run their own business. The 1.6 million self-employed and unpaid family workers in 2002 performed work directly for property owners or acted as contractors on small jobs, such as additions, remodeling, and maintenance projects. The rate of self-employment varies greatly by individual occupation in the construction trades (chart 2).

Table 1. Distribution of wage and salary employment in construction by industry, 2002
(Employment in thousands)

Industry	Employment	Percent
Total, all industries	6,731.7	100.0
Construction of Buildings	1,583.8	23.5
Residential building	807.4	12.0
Nonresidential building construction	776.4	11.5
Heavy and Civil Engineering Construction	930.0	13.8
Utility system construction	380.5	5.7
Highway, street, and bridge construction	344.4	5.1
Land subdivision	86.1	1.3
Other heavy and civil engineering construction	119.0	1.8
Special trade contractors	4,217.9	62.7
Building equipment contractors	1,842.5	27.4
Foundation, structure, and building exterior contractors	915.4	13.6
Building finishing contractors	879.5	13.1
Other specialty trade contractors	580.5	8.6

Occupations in the Industry

Construction offers a great variety of career opportunities. People with many different talents and educational backgrounds—managers, clerical workers, skilled craftworkers, semiskilled workers, and laborers—find job opportunities in the construction industry (table 2).

Most of the workers in construction are skilled craftworkers or laborers, helpers, and apprentices who assist the more skilled workers. Most construction workers generally are classified as either structural, finishing, or mechanical workers. *Structural workers* include carpenters; construction equipment operators; brickmasons, blockmasons, and stonemasons; cement masons and concrete finishers; and structural and reinforcing iron and

Table 2. Employment of wage and salary workers in construction by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-2012
	Number	Percent	
All occupations	6,732	100.0	15.1
Management, business, and financial occupations	576	8.6	14.5
Top executives	181	2.7	13.2
Construction managers	166	2.5	13.1
Cost estimators	100	1.5	19.6
Professional and related occupations	101	1.5	12.5
Architecture and engineering occupations	79	1.2	11.3
Sales and related occupations	127	1.9	13.0
Office and administrative support occupations	620	9.2	-0.2
Bookkeeping, accounting, and auditing clerks	125	1.9	1.9
Secretaries and administrative assistants	204	3.0	-5.1
Office clerks, general	123	1.8	1.4
Construction and extraction occupations	4,456	66.2	17.0
First-line supervisors/managers of construction trades and extraction workers	378	5.6	14.4
Brickmasons, blockmasons, and stonemasons	111	1.6	17.4
Carpenters	685	10.2	14.2
Carpet, floor, and tile installers and finishers	70	1.0	16.8
Cement masons, concrete finishers, and terrazzo workers	163	2.4	25.5
Construction laborers	675	10.0	13.2
Construction equipment operators	253	3.8	11.2
Drywall installers, ceiling tile installers, and tapers	139	2.1	24.3
Electricians	430	6.4	27.3
Painters and paperhangers	194	2.9	14.7
Pipelayers, plumbers, pipelitters, and steamfitters	380	5.7	22.5
Roofers	108	1.6	18.8
Sheet metal workers	134	2.0	22.8
Helpers, construction trades	390	5.8	12.3
Installation, maintenance, and repair occupations	434	6.5	23.1
Heating, air conditioning, and refrigeration mechanics and installers	114	1.7	37.5
Industrial machinery installation, repair, and maintenance workers	82	1.2	17.0
Production occupations	105	1.6	11.5
Transportation and material moving occupations	250	3.7	10.9
Truck drivers, heavy and tractor-trailer	97	1.4	14.5
Material moving occupations	118	1.8	7.7

NOTE: May not add to totals due to omission of occupations with small employment.

Chart 1. More than 80 percent of construction establishments employ fewer than 10 people

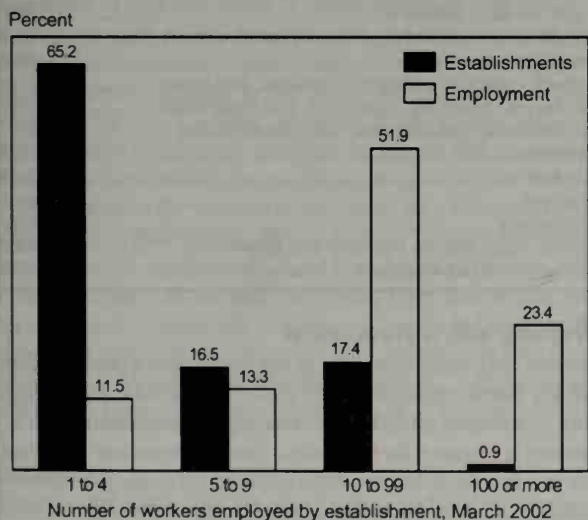
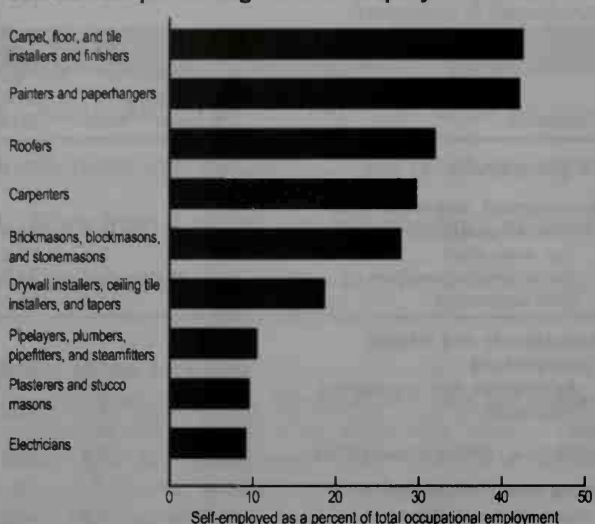


Chart 2. Many construction occupations have a substantial percentage of self-employed workers



metal workers. *Finishing workers* include carpenters; drywall installers, ceiling tile installers, and tapers; plasterers and stucco masons; segmental pavers; terrazzo workers; painters and paperhangers; glaziers; roofers; carpet, floor, and tile installers and finishers; and insulation workers. *Mechanical workers* include pipelayers, plumbers, pipefitters, and steamfitters; electricians; sheet metal workers; and heating, air-conditioning, and refrigeration mechanics and installers. Other workers, called *hazardous materials removal workers* remove hazardous materials such as asbestos, lead, and radioactive and nuclear materials from buildings, facilities, and the environment to prevent further contamination of natural resources and to promote public health and safety.

The greatest numbers of construction craftworkers are carpenters; electricians; pipelayers, plumbers, pipefitters, and steamfitters; construction equipment operators; painters and paperhangers; sheet metal workers; drywall installers, ceiling tile installers and tapers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; brickmasons, blockmasons, and stonemasons; and roofers. The construction industry employs nearly all of the workers in some construction craft occupations—such as plasterers and stucco masons; roofers; structural and reinforcing iron and metal workers; and drywall installers, ceiling tile installers, and tapers. In other construction craft occupations—for example, electricians; painters and paperhangers; plumbers, pipefitters, and steamfitters; and carpet floor, and tile installers and finishers—large numbers also work in other industries (table 3). Other industries employing large numbers of construction workers include transportation equipment manufacturing; transportation, communication, and utilities; real estate; wholesale and retail trade; educational services; and State and local government.

Many persons enter the construction crafts through apprenticeship programs. These programs offer on-the-job training under the close supervision of an experienced craftworker, and

formal classroom instruction. Depending on the trade, apprentices learn a variety of skills, ranging from laying brick to putting together steel beams.

Many persons advance to construction craft occupations from related, less skilled jobs as *helpers* or *laborers*. They acquire skills while they work. They are first hired as laborers or helpers, performing a variety of unskilled tasks and providing much of the routine physical labor needed in construction. They erect and dismantle scaffolding, clean up debris, help unload and carry materials and machinery, and operate simple equipment. They work with experienced craftworkers, learning the basic skills of a particular craft. After acquiring experience and skill in various phases of the craft, they may become skilled craftworkers.

To develop their skills further after training, construction craftworkers may work on many different projects, such as housing developments, office and industrial buildings, or highways, bridges, and dams. Flexibility and a willingness to adopt new techniques, as well as the ability to get along with people, are essential for advancement. Those who are skilled in all facets of the trade and who show good leadership qualities may be promoted to *supervisor*. As supervisors, they oversee craftworkers and helpers and ensure that work is done well. They plan the job and solve problems as they arise. Those with good organizational skills and exceptional supervisory ability may advance to *superintendent*. Superintendents are responsible for getting a project completed on schedule by working with the architect's plans, making sure materials are delivered on time, assigning work, overseeing craft supervisors, and ensuring that every phase of the project is completed properly and expeditiously. They also resolve problems and see to it that work proceeds without interruptions. Superintendents may advance to large projects as general managers and top executives. Some go into business for themselves as contractors.

Table 3. Percent of wage and salary workers in construction craft occupations employed in the construction industry, 2002

Occupation	Percent
Plasterers and stucco masons	87.6
Cement masons, concrete finishers, segmental workers, and terrazzo workers	86.5
Structural and reinforcing iron and metal workers	84.2
Insulation workers	82.5
Drywall installers, ceiling tile installers, and tapers	78.8
Pipelayers, plumbers, pipefitters, and steamfitters	69.2
Brickmasons, blockmasons, and stonemasons	67.1
Electricians	65.2
Roofers	64.9
Glaziers	64.5
Carpenters	56.7
Carpet, floor, and tile installers and finishers	42.5
Painters and paperhangers	41.5

Training and Advancement

Persons may enter most jobs in the construction industry without any formal classroom training after high school. Most skilled craft jobs require proficiency in reading and mathematics. Safety training is required for most jobs. Some laborers can learn their job in a few days, but the skills required for many jobs are substantial; they can be learned through apprenticeships or other

employer-provided training programs. Skilled workers such as carpenters, bricklayers, plumbers, and other construction trade specialists need either several years of informal on-the-job experience or apprenticeship training. Workers pick up skills by working with more experienced workers and through instruction provided by their employers. As they demonstrate their ability to perform tasks they are assigned, they move to progressively more challenging work. As they broaden their skills, they are allowed to work more independently, and responsibilities and earnings increase. They may qualify for jobs in related, more highly skilled, occupations. For example, after several years of experience, painters' helpers may become skilled painters.

Apprenticeships administered by local employers, trade associations, and trade unions provide the most thorough training. Apprenticeships usually last between 3 and 5 years and consist of on-the-job training and 144 hours or more of related classroom instruction each year. However, a number of apprenticeship programs are now using competency standards in place of time requirements, making it possible to complete a program in a shorter time. Those who enroll in apprenticeship programs usually are at least 18 years old and in good physical condition.

Persons can enter the construction industry with a variety of educational backgrounds. Those entering construction right out of high school start as laborers, helpers, or apprentices. Those who enter construction from technical or vocational schools also may go through apprenticeship training; however, they progress at a somewhat faster pace because they already have had courses such as mathematics, mechanical drawing, and woodworking. Skilled craftworkers may advance to supervisor or superintendent positions, or may transfer to jobs such as construction building inspector, purchasing agent, sales representative for building supply companies, contractor, or technical or vocational school instructor. In order to advance to a management position, additional education and training is recommended.

Managerial personnel usually have a college degree or considerable experience in their specialty. Individuals who enter construction with college degrees usually start as management trainees or construction managers' assistants. Those who receive degrees in construction science often start as field engineers, schedulers, or cost estimators. College graduates may advance to positions such as assistant manager, construction manager, general superintendent, cost estimator, construction building inspector, general manager or top executive, contractor, or consultant. Although a college education is not always required, administrative jobs usually are filled by people with degrees in business administration, finance, accounting, or similar fields.

Opportunities for workers to form their own firms are better in construction than in many other industries. Construction workers need only a moderate financial investment to become contractors and they can run their businesses from their homes, hiring additional construction workers only as needed for specific projects. The contract construction field, however, is very competitive, and the rate of business failure is high. Taking courses in business helps to improve the likelihood of success.

Earnings

Earnings in construction are significantly higher than the average for all industries (table 4). In 2002, production or

nonsupervisory workers in construction averaged \$18.51 an hour, or about \$712 a week. Average earnings of workers in the specialty trade contractors segment were somewhat higher than those of workers employed by building or heavy and civil engineering construction contractors.

Earnings of workers in the construction industry vary by the education and experience of the worker, type of work, the size and nature of the construction project, geographic location, and economic conditions. Earnings of construction trade workers are often affected by poor weather. Heavy rain may slow or even stop work on a construction project. Traditionally, winter is the slack period for construction activity, especially in colder parts of the country, but there is a trend toward more year-round construction even in colder areas. Because construction trades are dependent on one another—especially on large projects—work delays in one trade delay or stop work in another. Earnings in selected occupations in construction in 2002 appear in table 5.

Table 4. Average earnings of nonsupervisory workers in construction, 2002

Industry segment	Weekly	Hourly
Total, private industry	\$506	\$14.95
Construction industry	712	18.51
Construction of buildings	676	17.74
Industrial building	779	18.77
Nonresidential building	755	19.16
Commercial building	746	19.31
Residential building	597	16.24
Heavy and civil engineering construction	754	18.00
Highway, street, and bridge construction	813	19.16
Other heavy construction	780	18.13
Specialty trade contractors	715	18.91
Electrical contractors	816	20.75
Plumbing and HVAC contractors	781	19.93
Flooring contractors	688	18.46
Building finishing contractors	645	17.72
Masonry contractors	643	18.65
Painting and wall covering contractors	596	16.49
Roofing contractors	591	16.61

About 19 percent of construction trades workers were union members or covered by union contracts, compared with about 15 percent of workers throughout private industry. Many different unions represent the various construction trades and form joint apprenticeship committees with local employers to supervise apprenticeship programs.

Outlook

Job opportunities are expected to be excellent in the construction industry, especially for workers with training and experience in construction occupations, due largely to the numerous openings arising each year as experienced construction workers leave their jobs. Further, many potential workers may prefer work that is less strenuous and has more comfortable working conditions. The continued shortage of adequate training programs also will contribute to the favorable job market.

Table 5. Median hourly earnings of the largest occupations in construction, 2002

Occupation	Construction of buildings	Heavy and civil engineering construction	Specialty trade contractors	All industries
General and operations managers	\$35.36	\$38.16	\$33.98	\$32.80
Construction managers	30.49	30.83	29.94	30.53
First-line supervisors/managers of construction trades and extraction workers	23.38	22.88	22.80	22.92
Plumbers, pipefitters, and steamfitters	19.44	18.18	19.43	19.31
Carpenters	16.78	18.38	16.67	16.44
Insulation workers	16.50	13.60	13.57	13.91
Truck drivers, heavy and tractor-trailer	14.99	14.40	14.45	15.97
Painters, construction and maintenance	14.11	13.85	14.00	13.98
Construction laborers	12.15	12.66	11.97	11.90
Helpers—electricians	11.09	11.64	11.03	11.10

The number of wage and salary jobs in the construction industry is expected to grow about 15 percent through the year 2012, compared with the 16 percent projected for all industries combined. Employment in this industry depends primarily on the level of construction and remodeling activity. New construction is usually cut back during periods when the economy is not expanding, and the number of job openings in construction fluctuates greatly from year to year. Employment growth in the various segments of the construction industry varies somewhat, depending on the demand for various types of construction. At times, there may be a high demand for new office space or housing, for example, but lower demand for road construction or remodeling work.

Although household growth may slow slightly over the coming decade, the demand for residential construction is expected to continue to grow. The demand for larger homes with more amenities, as well as for second homes, will continue to rise, especially as the baby boomers reach their peak earning years and can afford to spend more on housing. Some older, more affluent baby boomers will want townhouses and condominiums in conveniently located suburban and urban settings. At the same time, as the number of immigrants increases and as the “echo boomers” (the children of the baby boomers) start to replace the smaller “baby bust” generation in the young adult age groups, the demand for manufactured housing, starter homes, and rental apartments also is expected to increase.

Employment is expected to grow in nonresidential construction because replacement of many industrial plants has been delayed for years, and a large number of structures will have to be replaced or remodeled. Construction of nursing homes, convalescent homes, and other extended care institutions also will increase due to the aging of the population, the growing use of high-technology medical treatment facilities, and the need for more drug treatment clinics. Construction of schools will increase to accommodate the children of the baby boom generation.

Employment in heavy and civil engineering construction is projected to increase due to growth in highway, bridge, and street construction, as well as in maintenance and repairs to prevent further deterioration of the Nation’s highways and bridges.

Employment in specialty trades contracting, the largest segment of the industry, should grow as demand for contractors in building and heavy construction rises and as more workers are

needed to repair and remodel existing homes. Home improvement and repair construction is expected to continue to grow faster than new home construction. Remodeling should be the fastest growing sector of the housing industry because of a growing stock of old residential and nonresidential buildings. Many “starter” units will be remodeled to appeal to more affluent, space- and amenity-hungry buyers. Also, some of the demand from the trade-up market may result in remodeling and additions rather than the construction of new, larger homes. Remodeling tends to be more labor-intensive than new construction.

Employment growth will differ among various occupations in the construction industry. Employment of construction managers is expected to grow as a result of advances in building materials and construction methods, as well as a proliferation of laws dealing with building construction, worker safety, and environmental issues. Construction managers who have a bachelor’s degree in construction science with an emphasis on construction management, and who acquire work experience in construction management services firms, should enjoy an especially favorable job outlook. Employment growth of administrative support occupations will be limited by increased office automation.

Although employment in construction trades as a whole is expected to grow about as fast as the industry average, the rate of growth will vary by trade. Employment of cement masons, concrete finishers, segmental pavers, and terrazzo workers; electricians; sheet metal workers; and heating, air-conditioning, and refrigeration mechanics and installers should grow faster than the industry average because technological changes are not expected to offset increases in employment demand as construction activity grows. On the other hand, employment of construction equipment operators; construction laborers; and boilermakers is expected to grow more slowly than that of the construction industry as a whole because greater use of new equipment will make workers more efficient.

Sources of Additional Information

Information about apprenticeships and training can be obtained from local construction firms and employer associations, the local office of the State employment service or apprenticeship agency, or the Bureau of Apprenticeship and Training, U.S. Department of Labor.

For additional information on jobs in the construction industry, contact:

- Associated Builders and Contractors, Workforce Development Department, 9th Floor, 4250 North Fairfax Dr., Arlington, VA 22203
- Associated General Contractors of America, Inc., 333 John Carlyle St., Alexandria, VA 22314.
Internet: <http://www.agc.org>
- National Association of Home Builders, 1201 15th St. NW., Washington, DC 20005-2800.
Internet: <http://www.nahb.org>
- Home Builders Institute, 1201 15th St., NW, Washington, DC 20005-2800. Internet: <http://www.hbi.org>

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their website: <http://www.doleta.gov>

Additional information on occupations in construction may be found in the 2004-05 edition of the *Occupational Outlook Handbook*:

- Brickmasons, blockmasons, and stonemasons
- Carpenters

- Carpet, floor, and tile installers and finishers
- Cement masons, concrete finishers, segmental pavers, and terrazzo workers
- Construction and building inspectors
- Construction equipment operators
- Construction laborers
- Construction managers
- Drywall installers, ceiling tile installers, and tapers
- Electricians
- Elevator installers and repairers
- Glaziers
- Hazardous materials removal workers
- Heating, air-conditioning, and refrigeration mechanics and installers
- Insulation workers
- Material-moving occupations
- Painters and paperhangers
- Pipelayers, plumbers, pipefitters, and steamfitters
- Plasterers and stucco masons
- Roofers
- Sheet metal workers
- Structural and reinforcing iron and metal workers

SIGNIFICANT POINTS

- Employment is projected to decline; however, job opportunities should be favorable for construction and extraction, and production workers in coal mining and nonmetallic mineral mining.
- While most mining jobs can be entered directly from high school, the increasing sophistication of equipment and machinery requires a higher level of technical skill.
- Working conditions can be dangerous.
- Earnings are higher than the average for all industries.

Nature of the Industry

Mining has played an important role in the development of the United States. In the past, the discovery of minerals such as gold and silver resulted in population shifts and economic growth. Extraction of minerals and coal continues to provide the foundation for local economies in some parts of the country. Products of this industry are used as inputs for consumer goods, processes, and services provided by all other industries, including agriculture, manufacturing, transportation, utilities, communication, and construction. Uses of mined materials include coal for energy, copper for wiring, gold for satellites and sophisticated electronic components, and a variety of other minerals as ingredients in medicines and household products.

Besides mining coal and metallic and nonmetallic minerals, employers in this industry explore for minerals and develop new mines and quarries. *Metallic minerals* include ores, such as bauxite—from which aluminum is extracted—copper, gold, iron, lead, silver, and zinc. *Nonmetallic minerals* include stone, sand, gravel, clay, and other minerals such as lime and soda ash, used as chemicals and fertilizers. This industry also includes initial mineral processing and preparation activities, because processing plants usually operate together with mines or quarries as part of the extraction process. (A separate section in the *Career Guide* covers careers in oil and gas extraction.)

Mining is the process of digging into the earth to extract naturally occurring minerals. There are two kinds of mining, *surface mining* and *underground mining*. Surface mining, also called open-pit mining or strip mining, is undertaken if the mineral is near the earth's surface. This method usually is more cost-effective and requires fewer workers to produce the same quantity of ore than does underground mining. In surface mining, after blasting with explosives, workers use huge earthmoving equipment, such as power shovels or draglines, to scoop off the layers of soil and rock covering the mineral bed. Once the mineral is exposed, smaller shovels are used to lift it from the ground and load it into trucks. The mineral also can be broken up using explosives, if necessary. In quarrying operations, workers use machines to extract stone used primarily as a building material. Stone, such as marble, granite, limestone, and sandstone, is quarried by splitting blocks of rock from a massive rock surface.

Underground mining is used when the mineral deposit lies deep below the surface of the earth. When developing an under-

ground mine, miners first must dig two or more openings, or tunnels, deep into the earth near the place where they believe coal or minerals are located. Depending on where the vein of ore is in relation to the surface, tunnels may be vertical, horizontal, or sloping. One opening allows the miners to move in and out of the mine with their tools and also serves as a path for transporting the mined rock by small railroad cars or by conveyor belts to the surface. The other opening is used for ventilation.

Entries are constructed so that miners can get themselves and their equipment to the ore and carry it out, while allowing fresh air to enter the mine. Once dug to the proper depth, a mine's tunnels interconnect with a network of passageways going in many directions. Long steel bolts and pillars of unmined ore support the roof of the tunnel. Using the room-and-pillar method, miners remove half of the ore as they work the ore seams from the tunnel entrance to the edge of the mine property, leaving columns of ore to support the ceiling. This process is then reversed, and the remainder of the ore is extracted, as the miners work their way back out. In the case of longwall mining of coal, self-advancing roof supports, made of hydraulic jacks and metal plates, are moved ahead, allowing the ceiling in the mined area to cave in as the miners work back towards the tunnel entrance.

Once all the minerals or coal have been extracted, the mine and its surrounding environment must be restored to the condition that existed before mining began. In surface mining, the layers of topsoil, or overburden, that were removed in order to reach the mineral are used to fill in the mine and reshape the land. This ensures that native plants and animals will be able to thrive once again. Underground mining does not require as extensive a reclamation process; however, mine operators and environmental engineers still must ensure that ground water remains uncontaminated and that abandoned mines will not collapse. The reclamation process is highly regulated by Federal, State, and local laws, and reclamation plans often must be approved before mining permits will be granted.

During the 1990s, production of both minerals and coal increased. Given the more volatile price of metal, its production fluctuated more than that of nonmetallics. However, employment in both sectors declined significantly, as new technology and more sophisticated mining techniques increased productivity, allowing growth in output while employing fewer workers. Most mining machines and control rooms are now automatic or

computer-controlled, requiring fewer, if any, human operators. Many mines also operate with other sophisticated technology such as lasers and robotics, which further decrease the number of workers needed to mine materials.

Working Conditions

The average production worker in the mining industry worked 45.0 hours a week in 2002. Work environments vary by occupation. Scientists and technicians work in office buildings and laboratories, while miners and mining engineers spend much of their time in the mine. Geologists who specialize in the exploration of natural resources may have to travel for extended periods to remote locations, in all types of climates, in order to locate mineral or coal deposits.

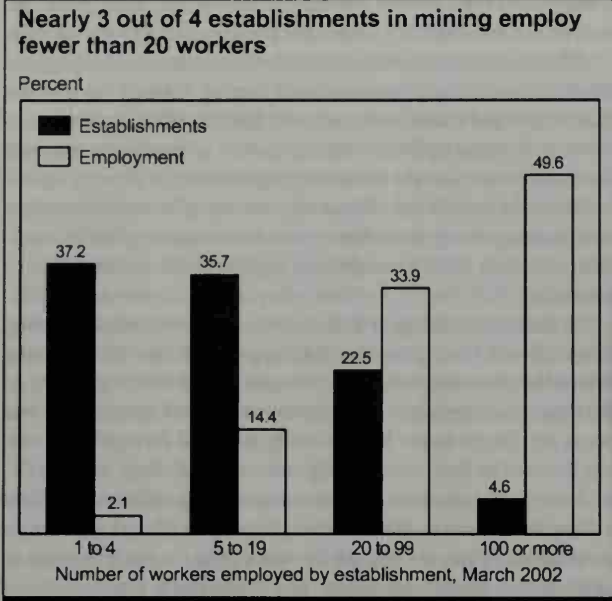
Working conditions in mines and quarries can be unusual and sometimes dangerous. Underground mines are damp and dark, and some can be very hot and noisy. At times, several inches of water may cover tunnel floors. Although underground mines have electric lights, only the lights on miners' caps illuminate many areas. Workers in mines with very low roofs may have to work on their hands and knees, backs, or stomachs, in confined spaces. In underground mining operations, dangers include the possibility of an explosion or cave-in, electric shock, or exposure to harmful gases.

Workers in surface mines and quarries are subject to rugged outdoor work in all kinds of weather and climates. Some surface mines shut down in the winter, because snow and ice covering the minesite makes work too difficult. Physical strength and stamina are necessary, because the work involves lifting, stooping, and climbing. Surface mining, however, usually is less hazardous than underground mining.

In 2002, the rate of work-related injury and illness was 4.1 per 100 full-time workers in metal mining, 3.8 in nonmetallic minerals, and 6.8 in coal mining, compared with 5.3 for the entire private sector. Mining illnesses and injuries have steadily declined over the years because of stricter safety laws and improvements in mining machinery and practices. Although mine health and safety conditions have improved dramatically, dust generated by drilling in mines still places miners at risk of developing either of two serious lung diseases: Pneumoconiosis, also called "black lung disease," from coal dust, or silicosis from rock dust. The Federal Coal Mine Health and Safety Act of 1969 regulates dust concentrations in coal mines, and respirable dust levels are closely monitored. Dust concentrations in mines have declined as a result. Underground miners have the option to have their lungs x-rayed when starting a job, with a mandatory follow-up x-ray 3 years later, in order to monitor any development of respiratory illness. Additional x-rays are given every 5 years, on a voluntary basis. Workers who develop black lung disease or silicosis may be eligible for Federal aid.

Employment

There were approximately 212,000 wage and salary jobs in the mining industry in 2002; around 74,000 in coal mining; 29,000 in metal mining; and 107,000 in nonmetallic mineral mining. According to the Energy Information Administration, there were around 1,400 coal mining operations in 26 States in 2002. Over half of all coal miners are employed in three States—Kentucky, Pennsylvania,



nia, and West Virginia. Other States employing large numbers of coal miners are Alabama, Illinois, Indiana, Virginia, and Wyoming. Metal mining is more prevalent in the West and Southwest, particularly in Arizona, Colorado, Nevada, New Mexico, and Utah. Nonmetallic mineral mining is the most widespread, as quarrying of nonmetallic minerals, such as stone, clay, sand, and gravel, is done in nearly every State. In many rural areas, mining operations are the main employer. About 73 percent of mining establishments employ fewer than 20 workers (see chart).

Occupations in the Industry

The mining industry requires many kinds of workers. In 2002, 7 out of 10 workers were in *construction and extraction, production, or transportation and material-moving* occupations (table 1).

Mining occupations. The majority of jobs in the mining industry are in construction and extraction occupations. Though most of these jobs can be entered into directly from high school, or after acquiring some experience and on-the-job training in an entry-level position, the increasing sophistication of equipment and machinery used in mining means a higher level of technical skill is now required for many positions.

Underground mining primarily includes three methods—conventional, continuous, and longwall mining. Conventional mining, which is being phased out, is the oldest method, requiring the most workers and procedures. In this method, a strip or "kerf" is cut underneath the ore seam to control the direction in which the ore falls after it has been blasted. *Cutting-machine operators* use a huge electric chain saw with a cutter from 6 to 15 feet long to cut the kerf. Next, *drilling-machine operators* drill holes in the ore where the *shot firers* place explosives. This potentially dangerous work requires workers to follow safety procedures, such as making sure everyone is clear of the area before the explosives are detonated. After the blast, *loading-machine operators* scoop up the material and dump it into small

rubber-tired cars run by *shuttle-car operators*, who bring the coal or ore to a central location for transportation to the surface.

The continuous mining method eliminates the drilling and blasting operations of conventional mining through the use of a machine called a continuous miner. Traditionally, a *continuous-mining machine operator* sits or lies in a machine's cab and operates levers that cut or rip out ore and load it directly onto a conveyor or shuttle car. However, the use of remote-controlled continuous mining machines—which have increased safety considerably—now allows an operator to control the machine from a distance.

In longwall mining, which is similar to continuous mining, *longwall-machine operators* run large machines with rotating drums that automatically shear ore and load it on a conveyor. At the same time, hydraulic jacks reinforce the roof of the tunnel. As ore is cut, the jacks are hydraulically winched forward, supporting the roof as they move along.

Many other workers are needed to operate safe and efficient underground mines. Before miners are allowed underground, a *mine safety inspector* checks the work area for such hazards as loose roofs, dangerous gases, and inadequate ventilation. If safety standards are not met, the inspector prohibits the mine from producing until conditions are made safe. *Rock-dust machine operators* spray the mine walls and floor to hold down dust, which can interfere with breathing.

Roof bolters operate the machines that automatically install roof support bolts to prevent roof cave-ins, the biggest cause of mining injuries. *Brattice builders* construct doors, walls, and partitions in tunnel passageways to force air into the work areas. *Shift bosses*, or *blue-collar worker supervisors*, oversee all operations at the worksite.

In surface mining, most miners operate huge machines that either remove the earth above the ore deposit, or dig and load the ore onto trucks. The number of workers required to operate a surface mine depends on the amount of overburden, or earth, above the ore seam. In many surface mines, the overburden is first drilled and blasted. *Overburden stripping operators* or *dragline operators* then scoop the earth away to expose the coal or metal ore. Some draglines are among the largest land machines on earth.

Next, *loading-machine operators* rip the exposed ore from the seam and dump it into trucks to be driven to the preparation plant. *Tractor operators* use bulldozers to move earth and ore and to remove boulders or other obstructions. *Truckdrivers* haul ore to railroad sidings or to preparation plants and transport supplies to mines.

Construction, maintenance, and repair occupations. Other workers, who are not directly involved in the extraction process, work in and around mines and quarries. For example, skilled *mechanics* are needed to repair and maintain the wide variety of mining machinery, and skilled *electricians* are needed to check and install electrical wiring. Mechanical and electrical repair work has become increasingly complex, as machinery and other equipment have become computerized. *Carpenters* construct and maintain benches, bins, and stoppings (barricades to prevent airflow through a tunnel). These workers generally need specialized training to work under the unusual conditions found in mines. Mechanics, for example, may have to repair machines while on

their knees, with only their headlamps to illuminate the working area.

Quarrying occupations. Workers at quarries have duties similar to those of miners. Using jackhammers and wedges, *rock splitters* remove pieces of stone from a rock mass. *Dredge operators* and *dipper tenders* operate power-driven dredges, or dipper sticks of dredges, to mine sand, gravel, and other materials from beneath the surfaces of lakes, rivers, and streams. Using power-driven cranes with dragline buckets, *dragline operators* excavate or move sand, gravel, and other materials.

Processing-plant occupations. Processing plants often are located next to mines or quarries. In these plants, rocks and other impurities are removed from the ore, which is then washed, crushed, sized, or blended to meet buyer specifications. Methods for physically separating the ore from surrounding material also include more complex processes, such as leaching—mixing the ore with chemical solutions or other liquids in order to separate materials. Most processing plants are highly mechanized and require only a few workers for the washing, separating, and crushing operations. *Processing-plant supervisors* oversee all operations. In plants that are not heavily mechanized, *washbox attendants* operate equipment that sizes and separates impurities from ore, and *shake tenders* monitor machinery that further cleans and sizes ore with a vibrating screen. Most jobs in the processing plant are repetitive and, as a result of highly computerized mechanization, are becoming more automated.

Management, business, and financial and professional and related occupations also are important to the mining industry. Administrative workers include top executives, who are responsible for making policy decisions. Staff specialists (such as *accountants*, *attorneys*, and *market researchers*) provide information and advice for policymakers.

Professional and related workers in mining include engineering, scientific, and technical personnel. *Environmental scientists and geoscientists* search for locations likely to yield coal or mineral ores in sufficient quantity to justify extraction costs. Using sophisticated technologies and equipment, such as the Global Positioning System (GPS)—a satellite system that locates points on the earth using radio signals transmitted by satellites—*surveyors* help to map areas for mining. *Mining and geological engineers* examine seams for depth and purity, determine the type of mine to build, and supervise the construction, maintenance, and operation of mines. *Mechanical engineers* oversee the installation of equipment, such as heat and water systems; *electrical engineers* oversee the installation and maintenance of electrical equipment; *civil engineers* oversee the building and construction of minesites, plants, roads, and other infrastructure; *safety engineers* direct health and safety programs; *chemical engineers* develop the chemical processes for transforming mined products into consumer goods, such as medications and fertilizers; and *materials engineers* determine the usefulness of mined ore and also develop processes for transforming the minerals into products.

Environmental engineers play an increasingly important role in mining, given environmental concerns and stringent Federal, State, and local regulations imposed on all operations. Restrictions imposed by environmental regulations make obtaining permits for new mine development projects increasingly difficult.

Table 1. Employment of wage and salary workers in mining and quarrying by occupation, 2002 and projected change, 2002-2012

(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-2012
	Number	Percent	
All occupations	212	100.0	-15.0
Management, business, and financial occupations	12	5.6	-11.9
Top executives	5	2.4	-10.8
Professional and related occupations	8	3.8	-17.4
Office and administrative support occupations	15	6.9	-17.0
Office clerks, general	3	1.2	-15.8
Construction and extraction occupations	66	31.1	-16.9
First-line supervisors/managers of construction trades and extraction workers	8	4.0	-16.7
Operating engineers and other construction equipment operators	16	7.8	-14.1
Electricians	4	1.9	-18.1
Continuous mining machine operators ...	8	3.7	-20.0
Mine cutting and channeling machine operators	4	2.0	-21.3
Roof bolters, mining	4	2.0	-28.0
Helpers—Extraction workers	6	2.9	-18.6
Extraction workers, all other	3	1.2	-24.6
Installation, maintenance, and repair occupations	29	13.6	-17.3
First-line supervisors/managers of mechanics, installers, and repairers	3	1.2	-21.8
Mobile heavy equipment mechanics, except engines	7	3.4	-18.9
Industrial machinery mechanics	4	1.8	-11.8
Maintenance and repair workers, general	8	3.7	-15.0
Maintenance workers, machinery	3	1.6	-19.9
Production occupations	28	13.2	-14.0
First-line supervisors/managers of production and operating workers	4	1.7	-14.1
Welders, cutters, solderers, and brazers	3	1.3	-12.9
Crushing, grinding, and polishing machine setters, operators, and tenders	6	3.0	-15.3
Miscellaneous production workers	4	1.7	-22.1
Transportation and material moving occupations	52	24.4	-11.9
Truck drivers, heavy and tractor-trailer	14	6.5	-0.1
Conveyor operators and tenders	3	1.4	-15.9
Excavating and loading machine and dragline operators	12	5.7	-10.1
Loading machine operators, underground mining	3	1.2	-19.1
Industrial truck and tractor operators	4	2.0	-10.3
Laborers and freight, stock, and material movers, hand	5	2.1	-26.5
Shuttle car operators	3	1.4	-35.7

NOTE: May not add to totals due to omission of occupations with small employment.

Mine owners and operators face substantial penalties should they fail to abide by current regulations. In addition, both Federal regulations, such as the Surface Mining Control and Reclamation Act (SMCRA), and State laws require that land reclamation be part of the mining process. Reclamation plans usually must be approved by both government officials and local interest groups. When a mining operation is closed, the land must be restored to its premine condition, which can include anything from leveling soil and removing waste to replanting vegetation.

Exploration, mine design, impact assessment, and restoration efforts can depend on computer analysis. In addition, rapid technological advancements, particularly in processing-plant operations, are the result of increased computerization. This has led to a growing reliance on computer professionals, such as *systems analysts, computer software engineers, and computer scientists*.

Training and Advancement

Workers in mining production occupations usually must be at least 18 years old, in good physical condition, and able to work in confined spaces. A high school diploma is not necessarily required. Most workers start as helpers to experienced workers and learn skills on the job; however, formal training is becoming more important, as more technologically advanced machinery and mining methods are used. Some employers prefer to hire recent graduates of high school vocational programs in mining or graduates of junior college or technical school programs in mine technology. Such programs usually are found only at schools in mining areas.

Mining companies must offer formal training in either classrooms or training mines for a few weeks before new miners actually begin work. The Federal Mine Safety and Health Act of 1977 mandates that each U.S. mine have an approved worker training program in health and safety issues. Each plan must include at least 40 hours of basic safety training for new miners with no experience in underground mines, and 24 hours for new miners in surface mines. In addition to new miner training, each miner must receive at least 8 hours of refresher safety training a year, and miners assigned to new jobs must receive safety training relating to their new task. The U.S. Mine Safety and Health Administration (MSHA) also conducts classes on health, safety, and mining methods, and some mining machinery manufacturers offer courses in machine operation and maintenance as well. The MSHA has recently put interactive training materials on its Web site, and also has translated many of the training materials into Spanish. Increasingly, mines are employing more high-tech tools for miner training, such as machinery simulators and virtual reality simulators. By simulating actual mine conditions and emergencies, mine workers are better prepared and companies can instantly assess a mineworker's progress and skills.

As production workers gain more experience, they can advance to higher paying jobs requiring greater skill. A mining machine operator's helper, for example, might become an operator. When vacancies occur, announcements are posted, and all qualified workers can bid for the job. Positions are filled on the basis of seniority and ability. Miners with significant experience or special training also can become mine safety, health, and com-

pliance officers, whose duties include mine safety inspection. According to MSHA, a mine safety, health, and compliance officer needs at least 5 years' experience as a miner, or a degree in mining engineering.

For professional and managerial positions in mining, a master's degree in engineering, one of the physical sciences, or business administration, is preferred. A number of colleges and universities have mining schools or departments and programs in mining or minerals. Environmental positions require regulatory knowledge and a strong natural science background, or a background in a technical field, such as environmental engineering or hydrology. To date, most environmental professionals have been drawn from the ranks of engineers and scientists who have had experience in the mining industry.

Universities and mining schools have introduced more environmental coursework into their programs, and mining firms are hiring professionals from existing environment-related disciplines and training them to meet their companies' needs. Additionally, specialized mine technology programs are offered by a few colleges. Enrollment in these programs can lead to a certificate in mine technology after 1 year, an associate degree after 2 years, or a bachelor's degree after 4 years. Courses cover areas such as mine ventilation, roof bolting, and machinery repairs.

Earnings

Average wage and salary earnings in mining were significantly higher than the average for all industries. In 2002, production workers, earned \$20.57 an hour in coal mining, \$20.54 an hour in metal mining, and \$16.57 an hour in nonmetallic minerals mining compared to the private industry average of \$14.95 an hour (table 2). Workers in underground mines spend time traveling from the mine entrance to their working areas, so that their paid workday is slightly longer than that of surface mine workers, 8 hours versus 7 1/4-hour shifts. Earnings in selected occupations in specified mining industries appear in table 3.

Around 21 percent of mineworkers are union members or are covered by union contracts, compared with about 15 percent of workers throughout private industry. About 23.7 percent of workers in coal mining and 29.2 percent in metal mining were union members in 2002, compared with about 13.8 percent of workers in nonmetallic mineral mining. Union coal miners are primarily represented by the United Mine Workers of America (UMWA). The United Steelworkers of America, the International Union of Operating Engineers, and other unions also represent miners.

Workers covered by UMWA contracts receive 11 paid holidays, 12 days of paid vacation each year, 4 additional floating

Table 3. Median hourly earnings of the largest occupations in coal mining and nonmetallic minerals, except fuels, 2002

Occupation	Mining, except oil and gas	All industries
General and operations managers	\$34.91	\$32.80
First-line supervisors/managers of construction trades and extraction workers ...	26.16	22.92
Mobile heavy equipment mechanics, except engines	18.43	17.29
Maintenance and repair workers, general	18.05	14.12
Continuous mining machine operators	16.93	16.75
Operating engineers and other construction equipment operators	16.23	16.94
Excavating and loading machine and dragline operators	15.21	15.58
Helpers—extraction workers	15.09	12.12
Crushing, grinding, and polishing machine setters, operators, and tenders	14.77	12.83
Truck drivers, heavy and tractor-trailer	14.59	15.97

holidays, and 5 days of sick leave; however, coal miners generally must take their vacations during 1 of 3 regular vacation periods, to assure a continuous supply of coal. As length of service increases, UMWA miners get up to 13 extra vacation days after 18 years of continuous employment. Union workers also receive benefits from a welfare and retirement fund.

Outlook

Wage and salary employment in mining is expected to decline by 15 percent through the year 2012, compared with 16 percent growth projected for the entire economy. This continuing long-term decline is due to increased productivity resulting from technological advances in mining operations, consolidation, stringent environmental regulations, and international competition. However, employment in nonmetallic mineral mining should grow slightly—2 percent—because of continued demand for crushed stone and gravel used in construction activities.

Despite declining employment, job opportunities should be favorable for construction, extraction, and production workers in coal mining and nonmetallic mineral mining. Many miners are approaching retirement age and younger miners will be hired to replace the retirees. Job turnover rates also are high in nonmetallic mineral mining because most mines are small and operate only during warm months; therefore, these mines tend to hire workers as they are needed. Jobs in nonmetallic mineral mining attract many migrant workers and those looking for summer employment. Job opportunities for professional workers, such as scientists and engineers, will be best in operations that provide exploration and mine construction services. Opportunities outside the United States will be more numerous because mining companies are shifting mining activities abroad.

Environmental concerns will continue to affect mining operations. Increasingly, government regulations are restricting access to land and restricting the type of mining that is performed in order to protect native plants and animals and decrease the amount of water and air pollution. As population growth expands further into the countryside, new developments are competing for land with mine operators, and residents are increasing their opposition to nearby mining activities.

Table 2. Average earnings of nonsupervisory workers in mining, except oil and gas, 2002

Industry segment	Weekly	Hourly
Total, private industry	\$506	\$14.95
Mining	837	18.62
Coal mining	934	20.57
Metal ore mining	879	20.54
Nonmetallic mineral mining and quarrying	749	16.57

Uncertainty over access to U.S. land to mine coal and minerals is forcing many mining operations to expand internationally, shifting jobs abroad. Often, lower labor costs and fewer environmental restrictions mean lower production costs. However, many U.S. mining companies must compete with international competitors. Increasing competition causes consolidation among mining operations, which usually leads to job cuts.

Advances in mining technology will also adversely affect employment in mining as new machinery and processes increase worker productivity. New mining machines that are computer-operated and can self-diagnose mechanical problems require fewer workers to operate and maintain. Advances in longwall and surface mining, which are less labor intensive, also have increased productivity, as have improvements in transportation and processing. Additionally, innovations such as roof bolting, self-advancing roof supports, and continuous mining machinery have led to safer, more efficient operations.

Although demand for coal should remain high, employment will decline by about a third through 2012. The products of the coal mining industry are used to produce electricity and steel products. Although production of coal is expected to increase, employment should continue to decline, as more efficient and automated production operations require less labor, and increased competition leads to further consolidation in the industry.

The long-term outlook for coal depends on how electric utility companies—the major consumers of coal—respond to provisions of the Clean Air Act Amendments of 1990, which attempt to limit the emission of sulfur dioxide and other harmful pollutants. Phase I of the Amendments, which took effect in 1995, requires reductions in sulfur emissions from coal combustion. Phase II took effect in 2000, and not only imposes stricter reductions in emissions, but targets the smaller coal-burning plants, not just the largest ones as in Phase I. Compliance involves the installation of costly cleaning and monitoring equipment or increased use of low-sulfur coal. The largest industrial nations also have been pressuring each other to decrease emissions of harmful gases into the atmosphere. As energy plants seek cleaner burning fuel, many new powerplants are being built to run on natural gas. If the demand for coal contracts as a result of stricter environmental regulations, employment in mines will decline further, as mine operators are forced to decrease production.

Despite the trend towards cleaner burning fuel, the United States still is highly dependent on coal as a source of energy. Coal accounts for half of the electricity production in this country because it is the cheapest and most abundant fossil fuel. The rising demand for cleaner burning fuel has resulted in regional shifts in coal production and markets. Because of this, lower sulfur Western coal now accounts for an increasing share of output. This trend is resulting in a gradual regional shift in employment from the Eastern States to the West. Improvements in clean coal technologies also may help the industry cope with increasingly restrictive regulations through projects such as the Integrated Gasification Combined Cycle (IGCC). This technology combines traditional coal gasification with gas-turbine and steam power to generate electricity more efficiently and reduce carbon and sulfur dioxide emissions.

As in coal mining, continuing productivity increases and industry consolidation are expected to cause employment in the

metal ore mining industry to decline through 2012. Because metals are used primarily as raw materials by other industries, such as telecommunications and steel, chemical, drug, aerospace, and automobile manufacturing, the strength of the metal ore mining industry is greatly affected by the strength of the industries that consume its products. The strength of these industries usually reflects the state of the U.S. and global economies. Thus, the strength of the economy over the next decade will influence employment in the metal mining industry.

Metal ore mining is also the sector most vulnerable to international competition. Many nations have mineral resources and, for some developing countries especially, mineral resources are one of the few goods they export. Therefore, mineral resources are being exploited faster than demand for them grows, which is driving down world commodity prices. Because production costs are often higher in the United States than in other countries, it is harder for U.S. companies to remain competitive. As commodity prices drop, many mines merge or reduce their workforce.

Like the metal mining industry, the nonmetallic mineral mining industry is influenced by the strength of the industries that use nonmetals in the manufacture of their products; these are industries in which employment is impacted by swings in the economy. Nonmetallic minerals are used to make concrete and agricultural chemicals and also are used as materials in residential, nonresidential, and maintenance construction. The nonmetallic mineral mining industry experienced slight employment growth over the past decade, largely attributable to construction. The demand for crushed stone and gravel should remain strong over the next few years because of demand for residential housing, roads, and airports.

Sources of Additional Information

For additional information about careers and training in the mining industry, contact:

- American Geological Institute, 4220 King St., Alexandria, VA 22302. Internet: <http://www.agiweb.org>
- Mine Safety and Health Administration, 1100 Wilson Blvd., Arlington, VA 22209-3939. Internet: <http://www.msha.gov>
- National Mining Association, 101 Constitution Ave. NW., Suite 500 East., Washington, DC 20001. Internet: <http://www.nma.org>
- Society for Mining, Metallurgy, and Exploration, Inc., 8307 Shaffer Parkway, Littleton, CO 80127. Internet: <http://www.smenet.org>
- United Mine Workers of America, 8315 Lee Highway, Fairfax, VA 22031. Internet: <http://www.umwa.org>

Information on the following occupations in mining may be found in the 2004-05 *Occupational Outlook Handbook*:

- Chemical engineers
- Civil engineers
- Electrical and electronics engineers, except computer
- Environmental engineers

- Environmental scientists and geoscientists
- Industrial machinery installation, repair, and maintenance workers
- Material-moving occupations
- Materials engineers
- Mechanical engineers

- Mining and geological engineers, including mine safety engineers
- Surveyors, cartographers, photogrammetrists, and surveying technicians
- Systems analysts, computer scientists, and database administrators
- Truckdrivers and driver/sales workers

SIGNIFICANT POINTS

- Most establishments employ fewer than 10 workers.
- About 77 percent of the industry's workforce is concentrated in California, Louisiana, Oklahoma, and Texas.
- Although technological innovations have expanded exploration and development worldwide, employment is expected to decline; however, workers with experience in oilfield operations are in demand.
- Earnings are relatively high.

Nature of the Industry

Petroleum, commonly referred to as oil, is a natural fuel formed from the decay of plants and animals buried beneath the ground, under tremendous heat and pressure, for millions of years. Formed by a similar process, natural gas often is found in separate deposits and is sometimes mixed with oil. Because oil and gas are difficult to locate, exploration and drilling are key activities in the oil and gas extraction industry. Oil and natural gas furnish about three-fifths of our energy needs, fueling our homes, workplaces, factories, and transportation systems. In addition, they constitute the raw materials for plastics, chemicals, medicines, fertilizers, and synthetic fibers.

Using a variety of methods, on land and at sea, small crews of specialized workers search for geologic formations that are likely to contain oil and gas. Sophisticated equipment and advances in computer technology have increased the productivity of exploration. Maps of potential deposits now are made using remote-sensing satellites. Seismic prospecting—a technique based on measuring the time it takes sound waves to travel through underground formations and return to the surface—has revolutionized oil and gas exploration. Computers and advanced software analyze seismic data to provide three-dimensional models of subsurface rock formations. This technique lowers the risk involved in exploring by allowing scientists to locate and identify structural oil and gas reservoirs and the best locations to drill. Four-D, or “time-lapsed,” seismic technology tracks the movement of fluids over time and enhances production performance even further. Another method of searching for oil and gas is based on collecting and analyzing core samples of rock, clay, and sand in the earth's layers.

After scientific studies indicate the possible presence of oil, an oil company selects a wellsite and installs a derrick—a tower-like steel structure—to support the drilling equipment. A hole is drilled deep into the earth until oil or gas is found, or the company abandons the effort. Similar techniques are employed in offshore drilling, except that the drilling equipment is part of a steel platform that either sits on the ocean floor, or floats on the surface and is anchored to the ocean floor. Although some large oil companies do their own drilling, most land and offshore drilling is done by contractors.

In rotary drilling, a rotating bit attached to a length of hollow drill pipe bores a hole in the ground by chipping and cutting rock. As the bit cuts deeper, more pipe is added. A stream of drilling “mud”—a mixture of clay, chemicals, and water—is continuously pumped through the drill pipe and through holes in the drill bit. Its purpose is to cool the drill bit, plaster the walls of the hole to prevent cave-ins, carry crushed rock to the surface, and prevent “blowouts” by equalizing pressure inside the hole. When a drill bit wears out, all drill pipe must be removed from the hole a section at a time, the bit replaced, and the pipe returned to the hole. New materials and better designs have advanced drill bit technology, permitting faster, more cost-effective drilling for longer periods.

Advancements in directional or horizontal drilling techniques, which allow increased access to potential reserves, have had a significant impact on drilling capabilities. Drilling begins vertically, but the drill bit can be turned so that drilling can continue at an angle of up to 90 degrees. This technique extends the drill's reach, enabling it to reach separate pockets of oil or gas. Because constructing new platforms is costly, this technique commonly is employed by offshore drilling operations.

When oil or gas is found, the drill pipe and bit are pulled from the well, and metal pipe (casing) is lowered into the hole and cemented in place. The casing's upper end is fastened to a system of pipes and valves called a wellhead, or “Christmas Tree,” through which natural pressure forces the oil or gas into separation and storage tanks. If natural pressure is not great enough to force the oil to the surface, pumps may be used. In some cases, water, steam, or gas may be injected into the oil-producing formation to improve recovery.

Crude oil is transported to refineries by pipeline, ship, barge, truck, or railroad. Natural gas usually is transported to processing plants by pipeline. While oil refineries may be many thousands of miles away from the producing fields, gas processing plants typically are near the fields, so that impurities—water, sulfur, and natural gas liquids—can be removed before the gas is piped to customers. The oil refining industry is considered a separate industry, and its activities are not covered here, even though many oil companies both extract and refine oil.

The oil and gas extraction industry has experienced both "booms" and "busts" over the years, illustrating the cyclical relationship between the price of oil and employment. Generally, the reaction of the labor market lags slightly behind the price fluctuations because oil companies must adjust their production levels accordingly. During the 1970s and early 1980s, the price of crude oil rose sharply, stimulating domestic exploration and production. Between 1978 and 1982—the year in which industry employment peaked—the oil and gas extraction industry grew 65 percent, creating 279,000 jobs, while employment in the economy as a whole remained flat. Starting in 1982, oil-producing countries around the world began pumping much larger volumes of crude oil, driving prices down; this culminated in the collapse of oil prices in the mid-1980s. During this time, the industry experienced a sharp decline in domestic exploration and production and an extended period of downsizing and restructuring, losing more than 415,000 jobs from 1982 to 1999. High oil prices in 2000 through 2003 led to small gains in employment.

Working Conditions

Working conditions in this industry vary significantly by occupation. Roustabout and other construction and extraction occupations may involve rugged outdoor work in remote areas in all kinds of weather. For these jobs, physical strength and stamina are necessary. This work involves standing for long periods, lifting moderately heavy objects, and climbing and stooping to work with tools that often are oily and dirty. Executives generally work in office settings, as do most administrators and clerical workers. Geologists, engineers, and managers may split their time between the office and the jobsites, particularly while involved in exploration work.

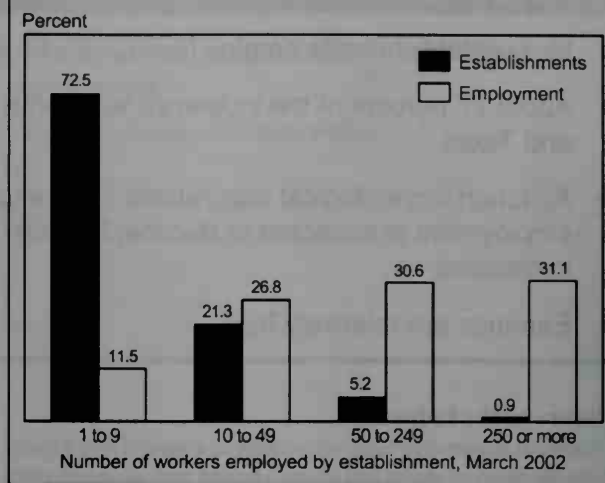
Only 1 employee in 12 works fewer than 35 hours a week, because opportunities for part-time work are rare. In fact, a higher percentage of workers work overtime in this industry than in all industries combined. The average nonsupervisory worker worked 39.5 hours per week in 2002, compared with 33.9 hours for all nonsupervisory workers on private nonfarm payrolls.

Oil and gas well drilling and servicing can be hazardous. However, in 2002 the rate of work-related injury and illness in the oil and gas extraction industry, as a whole, was 3.4 per 100 full-time workers, somewhat lower than the 5.3 for the entire private sector. The rate for workers in the oil and gas field services segment, 4.5 per 100 full-time workers, was almost 3 times higher than that for workers in the crude petroleum and natural gas segment, which was only 1.6. However, improvements in drilling technology and oil rig operations, such as remote-controlled drills, have led to fewer injuries.

Drilling rigs operate continuously. On land, drilling crews usually work 6 days, 8 hours a day, and then have a few days off. In offshore operations, workers can work 14 days, 12 hours a day, and then have 14 days off. If the offshore rig is located far from the coast, drilling crew members live on ships anchored nearby or in facilities on the platform itself. Workers on offshore rigs are always evacuated in the event of a storm. Most workers in oil and gas well operations and maintenance or in natural gas processing work 8 hours a day, 5 days a week.

Many oilfield workers are away from home for weeks or months at a time. Exploration field personnel and drilling work-

More than 70 percent of the establishments in oil and gas extraction employ fewer than 10 workers, but over half of the jobs are at establishments that employ at least 50 workers



ers frequently move from place to place as work at a particular field is completed. In contrast, well operation and maintenance workers and natural gas processing workers usually remain in the same location for extended periods.

Employment

The oil and gas extraction industry, with about 123,000 wage and salary jobs in 2002, is the largest industry in the mining division, accounting for one-quarter of employment. Although on-shore oil and gas extraction establishments are found in 32 States, more than 77 percent of the industry's workers in 2002 were located in just four States—California, Louisiana, Oklahoma, and Texas. While most workers are employed on land, many work at offshore sites. Although they are not included in employment figures for this industry, many Americans are employed by oil companies at locations in Africa, the North Sea, the Far East, the Middle East, South America, and countries of the former Soviet Union.

About 7 out of 10 establishments employ fewer than 10 workers, although more than 60 percent of all workers in this industry are employed in establishments with greater than 50 workers (see chart). As more large domestic oilfields and gasfields are depleted, major oil companies are focusing their exploration and production activity in foreign countries. Consequently, smaller companies with less capital for foreign exploration and production are drilling an increasing share of domestic oil and gas. Technology also has significantly decreased the risk and cost for smaller producers.

Relatively few oil and gas extraction workers are in their teens or early 20s. About 55 percent of the workers in this industry are between 35 and 54 years of age.

Occupations in the Industry

People with many different skills are needed to explore for oil and gas, drill new wells, maintain existing wells, and process natural gas. The largest group is professional and related work-

ers, accounting for about 23.1 percent of industry employment. Managerial, business, and financial workers account for about 20.8 percent of employment, while transportation and material moving workers make up about 11.8 percent, construction and extraction workers make up about 11.4 percent, and production workers make up about 11.3 percent (table 1).

A *petroleum geologist* or a *geophysicist*, who is responsible for analyzing and interpreting the information gathered, usually heads exploration operations. Other geological specialists also may be involved in exploration activities, including *paleontologists*, who study fossil remains to locate oil; *mineralogists*, who study physical and chemical properties of mineral and rock samples; *stratigraphers*, who determine the rock layers most likely to contain oil and natural gas; and *photogeologists*, who examine and interpret aerial photographs of land surfaces. Additionally, exploration parties may include *surveyors* and *drafters*, who assist in surveying and mapping activities.

Some geologists and geophysicists work in district offices of oil companies or contract exploration firms, where they prepare and study geological maps and analyze seismic data. These scientists also may analyze samples from test drillings.

Other workers involved in exploration are *geophysical prospectors*. They lead crews consisting of *gravity* and *seismic prospecting observers*, who operate and maintain electronic seismic equipment; *scouts*, who investigate the exploration, drilling, and leasing activities of other companies to identify promising areas to explore and lease; and *lease buyers*, who make business arrangements to obtain the use of the land or mineral rights from their owners.

Petroleum engineers are responsible for planning and supervising the actual drilling operation, once a potential drillsite has been located. These engineers develop and implement the most efficient recovery method, in order to achieve maximum profitable recovery. They also plan and supervise well operation and maintenance. *Drilling superintendents* serve as supervisors of drilling crews, overseeing one or more drilling rigs.

Rotary drilling crews usually consist of four or five workers. *Rotary drillers* supervise the crew and operate machinery that controls drilling speed and pressure. *Rotary-rig engine operators* are in charge of engines that provide the power for drilling and hoisting. Second in charge, *derrick operators* work on small platforms high on rigs to help run pipe in and out of well holes and operate the pumps that circulate mud through the pipe. *Rotary-driller helpers*, also known as *roughnecks*, guide the lower ends of pipe to well openings and connect pipe joints and drill bits.

Though not necessarily part of the drilling crew, *roustabouts*, or general laborers, do general oilfield maintenance and construction work, such as cleaning tanks and building roads.

Pumpers and their helpers operate and maintain motors, pumps, and other surface equipment that forces oil from wells and regulate the flow, according to a schedule set up by petroleum engineers and production supervisors. In fields where oil flows under natural pressure and does not require pumping, *switchers* open and close valves to regulate the flow. *Gaugers* measure and record the flow, taking samples to check quality. *Treaters* test the oil for water and sediment and remove these impurities by opening a drain or using special equipment. In

Table 1. Employment of wage and salary workers in oil and gas extraction by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	123	100.0	-27.8
Management, business, and financial occupations	26	20.8	-26.1
General and operations managers	5	3.9	-28.5
Financial managers	2	1.4	-26.5
Accountants and auditors	6	4.5	-26.8
Professional and related occupations	28	23.1	-25.3
Computer specialists	3	2.6	-21.9
Petroleum engineers	5	4.0	-26.5
Drafters, engineering, and mapping technicians	2	1.8	-25.5
Geoscientists, except hydrologists and geographers	4	3.4	-26.5
Geological and petroleum technicians	2	2.0	-23.3
Office and administrative support occupations	19	15.5	-37.5
Bookkeeping, accounting, and auditing clerks	4	3.1	-37.3
Information and record clerks	2	1.5	-31.1
Office clerks, general	4	3.0	-36.0
Executive secretaries and administrative assistants	3	2.4	-36.2
Secretaries, except legal, medical, and executive	3	2.6	-43.2
Construction and extraction occupations	14	11.4	-26.1
First-line supervisors/managers of construction trades and extraction workers	3	2.1	-26.5
Derrick operators, oil and gas	2	1.5	-26.5
Rotary drill operators, oil and gas	1	1.1	-26.5
Service unit operators, oil, gas, and mining	2	1.9	-26.5
Roustabouts, oil and gas	4	2.9	-26.5
Installation, maintenance, and repair occupations	6	4.5	-24.7
Industrial machinery mechanics	2	1.6	-22.5
Maintenance and repair workers, general ..	1	1.0	-26.5
Production occupations	14	11.3	-26.5
First-line supervisors/managers of production and operating workers	2	1.4	-26.5
Gas plant operators	2	1.4	-26.5
Petroleum pump system operators, refinery operators, and gaugers	8	6.7	-26.5
Transportation and material moving occupations	14	11.8	-27.2
Truck drivers, heavy and tractor-trailer ...	1	1.2	-22.8
Pump operators, except wellhead pumpers	4	3.0	-26.5
Wellhead pumpers	6	4.5	-26.5

NOTE: May not add to totals due to omission of occupations with small employment.

most fields, pumping, switching, gauging, and treating operations are automatic.

Other skilled oilfield workers include *oil well cementers*, who mix and pump cement into the space between the casing and well walls to prevent cave-ins; *acidizers*, who pump acid down the well and into the producing formation to increase oil flow;

perforator operators, who use subsurface “guns” to pierce holes in the casing to make openings for oil to flow into the well bore; *sample-taker operators*, who take samples of soil and rock formations from wells to help geologists determine the presence of oil; and *well pullers*, who remove pipes, pumps, and other subsurface devices from wells for cleaning, repairing, and salvaging.

Many other skilled workers—such as welders, pipefitters, electricians, and machinists—also are employed in maintenance operations to install and repair pumps, gauges, pipes, and other equipment.

In addition to the types of workers required for onshore drilling, crews at offshore locations also need radio operators, cooks, ships’ officers, sailors, and pilots. These workers make up the support personnel who work on or operate drilling platforms, crewboats, barges, and helicopters.

Most workers involved in gas processing are operators. *Gas treaters* tend automatically controlled treating units that remove water and other impurities from natural gas. *Gas-pumping-station operators* tend compressors that raise the pressure of gas for transmission in pipelines. Both types of workers can be assisted by *gas-compressor operators*.

Many employees in large natural gas processing plants—*welders, electricians, instrument repairers, and laborers*, for example—perform maintenance activities. In contrast, many small plants are automated and are checked at periodic intervals by maintenance workers or operators, or monitored by instruments that alert operators if trouble develops. In nonautomated plants, workers usually combine the skills of both operators and maintenance workers.

Training and Advancement

Workers can enter the oil and gas extraction industry with a variety of educational backgrounds. The most common entry-level field jobs are as roustabouts or roughnecks, jobs that usually require little or no previous training or experience. Applicants for these routine laborer jobs must be physically fit and able to pass a physical examination. Companies also may administer aptitude tests and screen prospective employees for drug use. Basic skills usually can be learned over a period of days through on-the-job training. However, previous work experience or formal training in petroleum technology that provides knowledge of oilfield operations and familiarity with computers and other automated equipment can be beneficial. In fact, given the increasing complexity of operations and the sophisticated nature of technology used today, employers now demand a higher level of skill and adaptability, including the ability to work with computers and other sophisticated equipment.

Other entry-level positions, such as engineering technician, usually require at least a 2-year associate degree in engineering technology. Professional jobs, such as geologist, geophysicist, or petroleum engineer, require at least a bachelor’s degree, but many companies prefer to hire candidates with a master’s degree, and may require a Ph.D. for those involved in petroleum research. For well operation and maintenance jobs, companies generally prefer applicants who live nearby, have mechanical ability, and possess knowledge of oilfield processes. Because

this work offers the advantage of a fixed locale, members of drilling crews or exploration parties who prefer not to travel may transfer to well operation and maintenance jobs. Training is acquired on the job.

Promotion opportunities for some jobs may be limited due to the general decline of the domestic petroleum industry. Advancement opportunities for oilfield workers remain best for those with skill and experience. For example, roustabouts may move up to become switchers, gaugers, and pumpers. More experienced roughnecks may advance to derrick operator and, after several years, to driller. Drillers may advance to tool pusher. There should continue to be some opportunities for entry-level field crew workers to acquire the skills that qualify them for higher level jobs within the industry. Due to the critical nature of the work, offshore crews, even at the entry level, generally are more experienced than land crews. Many companies will not employ someone who has no knowledge of oilfield operations to work on an offshore rig, so workers who have gained experience as part of a land crew might advance to offshore operations.

As workers gain knowledge and experience, U.S. or foreign companies operating in other countries also may hire them. Although this can be a lucrative and exciting experience, it may not be suitable for everyone, because it usually means leaving family and friends and adapting to different customs and living standards.

Experience gained in many oil and gas extraction jobs also has application in other industries. For example, roustabouts can move to construction jobs, while machinery operators and repairers can transfer to other industries with similar machinery. Geologists and engineers may become involved with environmental activities, especially those related to this industry.

Earnings

Average wage and salary earnings in the oil and gas extraction industry were significantly higher than the average for all industries. The average hourly earnings of non-supervisory workers in the oil and gas extraction industry were \$19.27, compared with \$14.95 for all workers in private industry. Due to the working conditions, employees at offshore operations generally earn

Table 2. Median hourly earnings of the largest occupations in oil and gas extraction, 2002

Occupation	Oil and gas extraction	All industries
General and operations managers	\$53.87	\$32.80
Geoscientists, except hydrologists and geographers	49.02	32.44
Petroleum engineers	44.96	40.08
Accountants and auditors	25.33	22.60
Petroleum pump system operators, refinery operators, and gaugers	22.78	23.69
Pump operators, except wellhead pumpers	19.08	17.53
Wellhead pumpers	17.29	16.24
Bookkeeping, accounting, and auditing clerks	15.68	13.16
Office clerks, general	13.21	10.71
Roustabouts, oil and gas	12.48	10.71

higher wages than do workers at onshore oil fields. College-educated workers and technical school graduates in professional and technical occupations usually earn the most. Earnings in selected occupations in oil and gas extraction appear in table 2.

Few industry workers belong to unions. In fact, only about 2 percent of workers were union members or were covered by union contracts in 2002, compared with about 15 percent of all workers throughout private industry.

Outlook

Although worldwide demand for oil and gas is expected to grow, overall wage and salary employment in the oil and gas extraction industry is expected to decline by 28 percent through the year 2012, while employment in all industries combined is projected to increase by 16 percent. Employment in establishments that contract work to larger oil companies, such as drilling and operating wells, will likely experience greater fluctuations in employment.

The level of future crude petroleum and natural gas exploration and development and, therefore, employment opportunities, remain contingent upon a number of uncertainties—most importantly, the future price of oil and gas. Sharply higher prices mean that companies, seeking greater profits, can be expected to implement new technologies, expand domestic and international exploration and production, and increase employment. Substantially lower prices, on the other hand, could make exploration and continued production from many existing wells unprofitable, resulting in reduced employment opportunities. Stable and favorable prices are needed to allow companies enough revenue to expand exploration and production projects in order to meet increased global energy demand. Stable oil prices also would allow for more stable employment levels, instead of the boom and bust that has affected the industry for the past few decades. However, maintaining high and stable prices is difficult, especially during economic downturns.

Environmental concerns, accompanied by strict regulation and limited access to protected Federal lands, also continue to have a major impact on this industry. Environmental constraints, especially restrictions on drilling in environmentally sensitive areas, should continue to limit exploration and development, both onshore and offshore. However, changes in policy could expand exploration and drilling for oil and natural gas in currently protected areas, especially in Alaska.

In addition, environmental emissions standards already in place or planned for the future could significantly limit the amount of sulfur and carbon dioxide levels that can be emitted by powerplants. Many new powerplants run on natural gas, as opposed to coal, which emits higher levels of sulfur into the atmosphere. The natural gas exploration and production industry, and its employment, would benefit from the increasing demand for cleaner-burning fuels. However, a lack of proper infrastructure for transporting natural gas, which is found mainly in unpopulated areas or offshore, currently limits natural gas consumption.

While some new oil and gas deposits are being discovered in this country, companies increasingly are moving to more lucrative foreign locations. As companies expand into other areas around the globe, the need for employees in the United States is reduced. However, advances in technology have increased the proportion of exploratory wells that yield oil and gas, enhanced offshore exploration and drilling capabilities, and extended the production of existing wells. As a result, more exploration and development ventures are profitable and provide employment opportunities that otherwise would have been lost.

Despite an overall decline in employment in the oil and gas extraction industry, job opportunities in most occupations should be favorable. The need to replace workers who transfer to other industries, retire, or leave the workforce will be the major source of job openings as more workers in this industry approach retirement age, and others seek more stable employment opportunities in other industries. Employment opportunities will be best for those with previous experience and with strong technical skills. There is strong demand for qualified professionals and extraction workers who have significant experience in oil field operations and who can work with new technology. As employers develop and implement new technologies—such as 3-D and 4-D seismic exploration methods, horizontal and directional drilling techniques, and deepwater and subsea technologies—more workers capable of using sophisticated equipment will be needed.

Sources of Additional Information

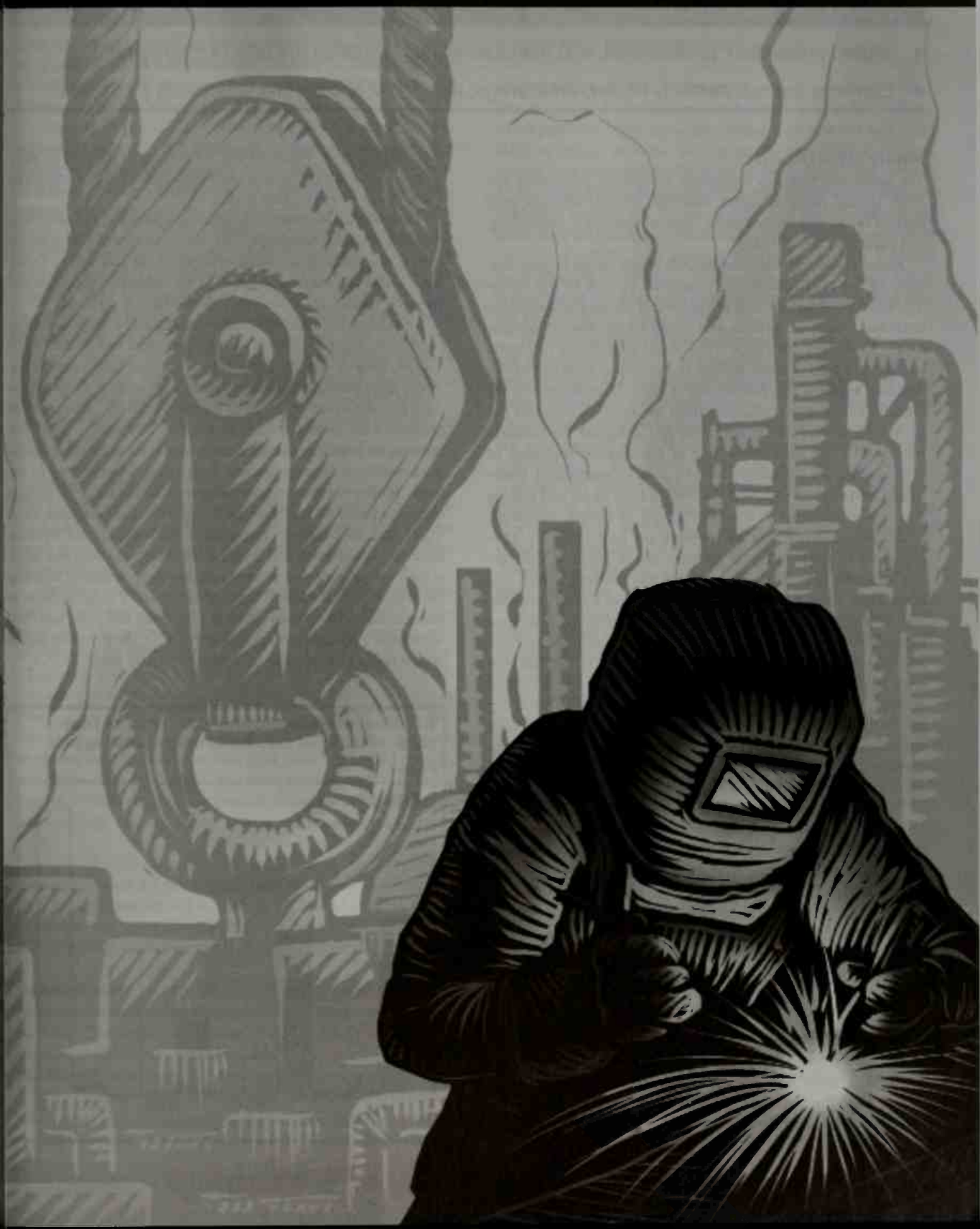
Information on training and career opportunities for petroleum engineers or geologists is available from:

- American Association of Petroleum Geologists, Communications Department, P.O. Box 979, Tulsa, OK 74101. Internet: <http://www.aapg.org>
- American Geological Institute, 4220 King St., Alexandria, VA 22302. Internet: <http://www.agiweb.org>
- Society of Petroleum Engineers, P.O. Box 833836, Richardson, TX 75083. Internet: <http://www.spe.org>

Information on some occupations in the oil and gas extraction industry may be found in the 2004-05 *Occupational Outlook Handbook*:

- Construction equipment operators
- Construction laborers
- Engineering and natural sciences managers
- Environmental engineers
- Environmental scientists and geoscientists
- Material-moving occupations
- Petroleum engineers
- Structural and reinforcing iron and metal workers
- Surveyors, cartographers, photogrammetrists, and surveying technicians

Manufacturing



Aerospace Product and Parts Manufacturing

(NAICS 3364)

SIGNIFICANT POINTS

- Skilled production, professional, and managerial jobs comprise the bulk of employment.
- Earnings are substantially higher, on average, than in most other manufacturing industries.

Nature of the Industry

The aerospace industry comprises companies producing aircraft, guided missiles, space vehicles, aircraft engines, propulsion units, and related parts. Aircraft overhaul, rebuilding, and parts also are included.

Firms producing transport aircraft make up the largest segment of the civil (non-military) aircraft portion of the industry. Civil transport aircraft are produced for air transportation businesses such as airlines and cargo transportation companies. These aircraft range from small turboprops to jumbo jets and are used to move people and goods all over the world. Another segment of civil aircraft is general aviation aircraft. General aviation aircraft range from the small two-seaters designed for leisure use to corporate jets designed for business transport. Civil helicopters, one of the smallest segments of civil aircraft, are commonly used by police departments, emergency medical services, and businesses such as oil and mining companies that need to transport people to remote worksites.

Military aircraft and helicopters are purchased by governments to meet national defense needs, such as delivering weapons to military targets and transporting troops and equipment around the globe. Some of these aircraft are specifically designed to deliver a powerful array of ordnance to military targets with tremendous maneuverability and low detectability. Aircraft engine manufacturers, not the aircraft manufacturers, produce the engines used in civil and military aircraft. These manufacturers design and build engines according to the aircraft design and performance specifications of the aircraft manufacturers. Aircraft manufacturers may use engines designed by different companies on the same type of aircraft.

Firms producing guided missiles and missile propulsion units sell primarily to military and government organizations. Although missiles are viewed predominantly as offensive weapons, improved guidance systems have led to their increased use as defensive systems. This part of the industry also produces space vehicles and the rockets for launching them into space. Consumers of spacecraft include the National Aeronautics and Space Administration (NASA), the U.S. Department of Defense (DOD), telecommunications companies, television networks, and news organizations. Firms producing space satellites are discussed with the computer and electronic product manufacturing industry in this publication because satellites are primarily electronic products.

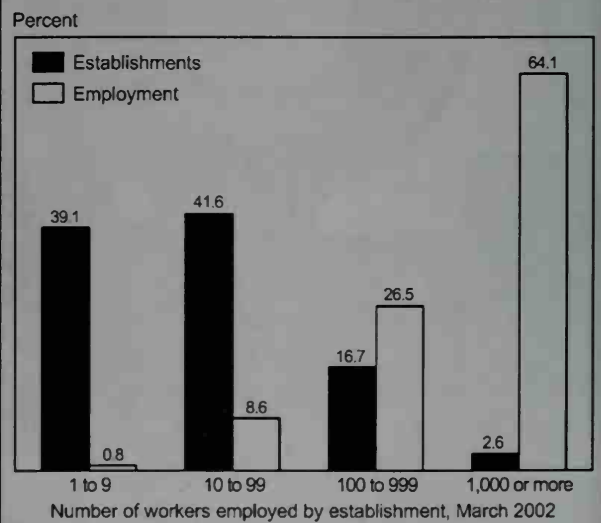
In 2002, about 2,800 establishments made up the aerospace industry. In the aerospace parts industry, most establishments were subcontractors that manufacture parts and employ fewer

than 100 workers. Nevertheless, 64 percent of the jobs in aerospace manufacturing were in large establishments that employed 1,000 or more workers (see chart).

The Federal Government traditionally has been the aerospace industry's biggest customer. The vast majority of Government contracts to purchase aerospace equipment are awarded by DOD. NASA also is a major purchaser of the industry's products and services, mainly for space vehicles and launch services.

The aerospace industry is dominated by a few large firms that contract to produce aircraft with Government and private businesses, usually airline and cargo transportation companies. These large firms, in turn, subcontract with smaller firms to produce specific systems and parts for their vehicles. Government purchases are largely related to defense. Typically, DOD announces its need for military aircraft or missile systems, specifying a multitude of requirements. Large firms specializing in defense products subsequently submit bids, detailing proposed technical solutions and designs, along with cost estimates, hoping to win the contract. Firms may also research and develop materials, electronics, and components relating to their bid, often at their own expense, in order to enhance their chance of winning the contract. Following a negotiation phase, a manufacturer is selected and a prototype vehicle is developed and built, and then tested and evaluated. If approved by DOD, the program enters production. This process usually takes many years.

Establishments employing 1,000 or more people account for most aerospace manufacturing jobs



Commercial airlines and private businesses typically identify their needs for a particular model of new aircraft based on a number of factors, including the routes they fly. After specifying requirements such as range, size, cargo capacity, type of engine, and seating arrangements, the airlines invite manufacturers of civil aircraft and aircraft engines to submit bids. Selection ultimately is based on a manufacturer's ability to deliver reliable aircraft that best fit the purchaser's stated market needs at the lowest cost and at favorable financing terms.

The way in which commercial and military aircraft are designed, developed, and produced is undergoing significant change in response to the need to cut costs and deliver products more quickly. Firms producing commercial aircraft have reduced development time drastically through computer-aided design (CAD), which allows firms to design an entire aircraft, including the individual parts, solely by computer. The drawings of these parts can be sent electronically to subcontractors who use them to program their machinery. Product development teams are increasingly being used through every phase of development, bringing customers, engineers, and production workers together to make decisions concerning the aircraft. Additionally, the military has changed its design philosophy, using available commercially available, off-the-shelf technology when appropriate, rather than developing new customized components.

Working Conditions

The average aerospace products and parts production employee worked 42.3 hours a week in 2002, compared with 40.5 hours a week throughout manufacturing and 33.9 hours a week across all industries.

Working conditions in aerospace manufacturing facilities vary. Many new plants, in contrast to older facilities, are spacious, well lit, and modern. Specific work environments usually depend on the occupation and age of the production line. Engineers, scientists, and technicians frequently work in office settings or laboratories, although production engineers may spend much of their time with production workers on the factory floor. Production workers, such as welders and other assemblers, may have to cope with high noise levels. Oil, grease, and grime often are present, and some workers may face exposure to volatile organic compounds found in solvents, paints, and coatings. Heavy lifting is required for many production jobs.

Cases of work-related injury and illness in the aircraft and parts sector were 5.7 per 100 full-time workers in 2001, higher than the 1.6 cases per 100 workers in the guided missiles sector. In comparison, cases of work-related injury and illness throughout the private sector averaged 5.3 per 100 workers.

Employment

Aerospace manufacturing provided 468,000 wage and salary jobs in 2002. The largest numbers of aerospace jobs were in Washington and California, although many also were located in Kansas, Texas, Connecticut, and Arizona.

Under the new North American Industry Classification System (NAICS), workers in research and development (R&D) establishments that are not part of a manufacturing facility are

included in a separate industry—research and development in the physical, engineering, and life sciences. However, due to the importance of R&D work to the aerospace manufacturing industry, aerospace-related R&D is discussed here even though a large proportion of aerospace-related R&D workers are not included in the employment data.

Occupations in the Industry

The design and manufacture of the technologically sophisticated products of the aerospace industry require the input and skills of various workers. Skilled production, professional and related, and managerial jobs make up the bulk of employment. Those employed in managerial and administrative support occupations manage the design process and factory operations, coordinate the hundreds of thousands of parts that are assembled into an aircraft, and ensure compliance with Federal recordkeeping regulations. The aerospace industry has a larger proportion of workers with education beyond high school than the average for all industries.

The aerospace industry is on the leading edge of technology and constantly is striving to create new products and improve existing ones. The industry invests a great amount of time and money in research and development of aerospace products, and much of the work is performed by professional and related workers, who made up about 31 percent of the aerospace workforce in 2002 (table 1). In addition, thousands more aerospace-related professionals work in research and development in the physical, engineering, and life sciences industry. A bachelor's degree in a specialized field, such as engineering, is required for many of these jobs; a master's or doctoral degree is preferred for a few. Two years of technical training after high school is favored for many technician occupations.

Professionals and technicians develop new designs and make improvements to existing designs. *Aerospace engineers* are integral members of the teams that research, design, test, and produce aerospace vehicles. Some specialize in areas such as structural design, guidance, navigation and control, and instrumentation and communication. Electrical and electronics, industrial, and mechanical engineers also contribute to the research for and development and production of aerospace products. For example, *mechanical engineers* help design mechanical components and develop the specific tools and machines needed to produce aircraft, missile, and space vehicle parts, or they may design jet and rocket engines. *Engineering technicians* assist engineers, both in the research and development laboratory, and on the manufacturing floor. They may help build prototype versions of newly designed products, run tests and experiments, and perform a variety of other technical tasks. One of the earliest users of CAD, the aerospace industry continues to use the latest computer technology. *Computer scientists and systems analysts; database administrators; computer software engineers; computer programmers; computer support specialists; and network and computer systems administrators* are responsible for the design, testing, evaluation, and setup of computer systems that are used throughout the industry for design and manufacturing purposes.

Management, business, and financial occupations accounted for 16 percent of industry employment in 2002. Many advance to

these jobs from professional occupations. Many managers in the aerospace industry have a technical or engineering background, and supervise teams of engineers in activities such as testing and research and development. *Industrial production managers* oversee all workers and lower-level managers in a factory. They also coordinate all activities related to production. In addition to technical and production managers, *financial managers*; *purchasing managers*, *buyers*, and *purchasing agents*; *cost estimators*; and *accountants and auditors* are needed to negotiate with customers and subcontractors and to track costs.

Of all aerospace workers, 40 percent are employed in production; installation, maintenance, and repair; and transportation and material moving occupations. Many of these jobs are not specific to aerospace and can be found in other manufacturing industries. Many production jobs are open to persons with only a high school education; however, special vocational training after high school is preferred for some of the more highly skilled jobs.

Aircraft structure, surfaces, rigging, and systems assemblers usually specialize in one assembly task; hundreds of different assemblers may work at various times on producing a single aircraft. Assemblers may put together parts of airplanes, such as wings or landing gear, or install parts and equipment into the airplane itself. Those involved in assembling aircraft or systems must be skilled in reading and interpreting engineering specifications and instructions.

Machinists make parts that are needed in numbers too small to be mass produced. They follow blueprints and specifications and are highly skilled with machine tools and metalworking. *Tool and die makers* are responsible for constructing precision tools and metal forms, called dies, which are used to shape metal. Increasingly, as individual components are designed electronically, these highly skilled workers must be able to read electronic blueprints and setup and operate computer-controlled machines.

Inspectors, testers, sorters, samplers, and weighers perform numerous quality control and safety checks on aerospace parts throughout the production cycle. Their work is vital to ensure the safety of the aircraft.

The remaining jobs in the industry are in office and administrative support, service, and sales occupations. Most of these jobs can be entered without education beyond high school. Workers in office and administrative support occupations help coordinate the flow of materials to the worksite, draw up orders for supplies, keep records, and help with all of the other paperwork associated with keeping a business functioning. Those in service occupations are employed mostly as guards and janitors and other cleaning and maintenance workers. Sales workers are mostly wholesale and manufacturing sales representatives and sales workers supervisors.

Training and Advancement

Because employers need well-informed, knowledgeable employees who can keep up with the rapid technological advancements in aerospace manufacturing, the industry provides substantial support for the education and training of its workers. Firms provide on-site, job-related training to upgrade the skills of technicians, production workers, and engineers. Classes teaching

Table 1. Employment of wage and salary workers in aerospace manufacturing by occupation, 2002 and projected change, 2002-12

(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	468	100.0	-17.6
Management, business, and financial occupations	76	16.2	-14.7
Industrial production managers	5	1.0	-15.8
Engineering managers	9	1.8	-15.8
Buyers and purchasing agents	9	2.0	-17.5
Management analysts	11	2.4	-15.8
Financial specialists	6	1.3	-16.1
Professional and related occupations	144	30.7	-15.2
Computer software engineers	8	1.7	-6.4
Computer systems analysts	7	1.6	-9.4
Aerospace engineers	46	9.7	-15.8
Industrial engineers, including health and safety	10	2.1	-15.8
Mechanical engineers	9	1.5	-21.5
Engineering technicians, except drafters	16	3.4	-15.8
Service occupations	5	1.1	-21.3
Sales and related occupations	5	1.0	-16.2
Office and administrative support occupations	42	9.0	-26.2
Production, planning, and expediting clerks	8	1.7	-15.8
Secretaries and administrative assistants	8	1.6	-29.6
Office clerks, general	5	1.1	-26.7
Construction and extraction occupations	8	1.8	-14.8
Installation, maintenance, and repair occupations	37	8.0	-8.6
Avionics technicians	5	1.1	-5.2
Aircraft mechanics and service technicians	15	3.1	-1.2
Industrial machinery installation, repair, and maintenance workers	7	1.5	-15.0
Production occupations	141	30.0	-21.5
First-line supervisors/managers of production and operating workers	11	2.3	-15.8
Aircraft structure, surfaces, rigging, and systems assemblers	21	4.5	-15.8
Miscellaneous assemblers and fabricators	15	3.3	-24.7
Computer control programmers and operators	8	1.6	-17.7
Machine tool cutting setters, operators, and tenders, metal and plastic	14	2.9	-24.2
Machinists	15	3.2	-22.0
Inspectors, testers, sorters, samplers, and weighers	15	3.1	-25.6
Transportation and material moving occupations	10	2.2	-20.6

NOTE: May not add to totals due to omission of occupations with small employment

computer skills and blueprint reading are common. Some firms reimburse employees for educational expenses at colleges and universities, emphasizing 4-year degrees and postgraduate studies.

Professionals, such as engineers and scientists, require a bachelor's degree in a specialized field. For some jobs, particularly in research and development, a master's or doctoral degree may be preferred.

Production workers may enter the aerospace industry with minimal skills. Mechanical aptitude and good hand-eye coordination usually are necessary. A high school diploma or equivalent is required, and some vocational training in electronics or mechanics also is favored.

Unskilled production workers typically start by being shown how to perform a simple assembly task. Through experience, on-the-job instruction provided by other workers, and brief, formal training sessions, they expand their skills. Their pay increases as they advance into more highly skilled or responsible jobs. For example, machinists may take additional training to become numerical tool and process control programmers or tool and die makers. Inspectors usually are promoted from assembly, machine operation, and mechanical occupations.

Due to the reliance on computers and computer-operated equipment, classes in computer skills are common. With training, production workers may be able to advance to supervisory or technician jobs.

To enter some of the more highly skilled production occupations, workers must go through a formal apprenticeship. Machinists and electricians complete apprenticeships that can last up to 4 years. Apprenticeships usually include classroom instruction and shop training.

Entry-level positions for technicians usually require a degree from a technical school or junior college. Companies sometimes retrain technicians to upgrade their skills or to teach different specialties. They are taught traditional as well as new production technology skills, such as computer-aided design and manufacturing and statistical process control methods.

Earnings

Production workers in the aerospace industry earn higher pay than the average for all industries. Weekly earnings for production workers averaged \$934 in aerospace product parts manufacturing in 2002, compared with \$619 in all manufacturing and \$506 in all private industry. Above-average earnings reflect, in part, the high levels of skill required by the industry and the need to motivate workers to concentrate on maintaining high quality standards in their work. Nonproduction workers, such as engineering managers, engineers, and computer specialists, generally command higher pay due to their advanced education and training (table 2).

In 2002, 22 percent of all workers in the aerospace industry were union members or covered by union contracts, compared with about 15 percent of all workers throughout private industry. Some of the major aerospace unions include the International Association of Machinists and Aerospace Workers; the United Automobile, Aerospace, and Agricultural Implement Workers of America; the Society of Professional Engineering

Table 2. Median hourly earnings of the largest occupations in aerospace product and parts manufacturing, 2002

Occupation	Aerospace product and parts manufacturing	All industries
Aerospace engineers	\$34.09	\$34.97
Mechanical engineers	31.33	30.23
Industrial engineers	30.59	29.88
Management analysts	28.96	29.01
First-line supervisors/managers of production and operating workers	26.86	20.64
Aircraft mechanics and service technicians	19.68	20.71
Aircraft structure, surfaces, rigging, and systems assemblers	19.66	18.71
Inspectors, testers, sorters, samplers, and weighers	18.24	13.01
Machinists	17.47	15.66
Team assemblers	13.20	10.90

Employees in Aerospace (SPEEA); and the International Union of Allied Industrial Workers of America.

Outlook

Employment in the aerospace products and parts manufacturing industry is expected to decrease by 18 percent over the 2002-2012 period, compared with the 16-percent growth projected for all industries combined. Employment in the aerospace industry has declined in the past few years due to a drastic reduction in commercial transport aircraft orders, and relatively little increase in orders is expected over the projection period. This decline in orders was caused by the reduction in air travel that resulted from the terrorist attacks on the United States, as well as severe financial problems many of the Nation's airlines have experienced. In addition, the industry will continue to experience strong foreign competition in the commercial transport market.

The outlook for the military aircraft and missiles portion of the industry is better. Growing concern for the Nation's security has increased the need for military aircraft and military aerospace equipment as well as for military aerospace personnel. Although new employment opportunities in the defense-related sector of the aerospace industry may not reach previous levels, the increased need for aerospace defense will boost the demand for employment within this sector.

Due to past reductions in defense expenditures and competition in the commercial aircraft sector, there have been and may continue to be mergers within the industry that sometimes result in layoffs. Even though the number of large firms performing final assembly of aircraft has been reduced, hundreds of smaller manufacturers and subcontractors will remain in this industry.

Despite an expected decline in employment of professional workers in the industry, there still may be a significant number of openings in the industry due to replacement needs, especially for engineers. Many engineers who entered the industry in the 1960s are approaching retirement. Overall, professionals in the aerospace manufacturing industry typically enjoy more employment stability than do other workers. During slowdowns in pro-

duction, companies prefer to keep technical teams intact to continue research and development activities, in anticipation of new business. Production workers, on the other hand, are particularly vulnerable to layoffs during downturns in the economy, when aircraft orders decline.

Sources of Additional Information

For additional information about the aerospace manufacturing industry, write to:

- Aerospace Industries Association of America, Communications Department, 1000 Wilson Boulevard, 17th Floor, Arlington, VA 22209.
Internet: <http://www.aia-aerospace.org>
- American Institute of Aeronautics and Astronautics, Inc., Suite 500, 1801 Alexander Bell Dr., Reston, VA 20191-4344. Internet: <http://www.aiaa.org>
- Federal Aviation Administration, 800 Independence Ave., SW., Room 810, Washington, DC 20591.
Internet: <http://www.faa.gov/education>

Information on the following occupations may be found in the 2004-05 edition of the *Occupational Outlook Handbook*.

- Aerospace engineers
- Aircraft and avionics equipment mechanics and service technicians
- Assemblers and fabricators
- Computer programmers
- Computer software engineers
- Computer systems analysts, database administrators, and computer scientists
- Electrical and electronics engineers, except computer
- Engineering managers
- Engineering technicians
- Industrial engineers, including health and safety
- Inspectors, testers, sorters, samplers, and weighers
- Machine setters, operators, and tenders—metal and plastic
- Machinists
- Mechanical engineers

Apparel Manufacturing

(NAICS 315)

SIGNIFICANT POINTS

- More than 40 percent of all workers are sewing machine operators.
- Primarily due to increased imports and the adoption of new technology, apparel manufacturing is projected to lose 245,000 jobs—more than almost any other industry—over the 2002-12 period.
- Average earnings are below those of other manufacturing industries.

Nature of the Industry

Workers in the apparel industry transform fabrics produced by textile manufacturers into clothing and accessories that fill the Nation's retail stores. By cutting and sewing fabrics or other materials, such as leather, rubberized fabrics, plastics, and furs, workers in this industry help to keep us warm, dry, and in style.

The apparel industry traditionally has consisted mostly of production workers who performed the cutting and sewing functions in an assembly line. This industry remains a labor-intensive one, despite advances in technology and workplace practices. Although many workers still perform this work in the United States, the industry is increasingly opening factories in other countries or contracting out its production work to foreign suppliers to take advantage of other countries' lower labor costs. In its place, a growing number of apparel manufacturers are performing only the entrepreneurial functions involved in apparel manufacturing. These include buying raw materials, designing clothes and accessories and preparing samples, arranging for the production and distribution of the apparel, and marketing the finished product.

Many of the remaining production workers work in teams, in which garments are made by a group of sewing machine operators organized into a production "module." Each operator in a module is trained to perform nearly all of the functions required to assemble a garment. Each team is responsible for its own performance, and individuals usually receive compensation based on the team's performance.

Technology affecting the apparel industry includes computerized equipment and material transport systems. Computers and computer-controlled equipment aid in many functions, such as design, patternmaking, and cutting. Wider looms, more computerized equipment, and the increasing use of robotics to move material within the plant are other technologies recently designed to make the production plant more efficient. Despite these changes, however, the apparel industry—especially its sewing function—has remained significantly less automated than many other manufacturing industries.

One of the best assets that the domestic industry has over its competition from abroad is its closeness to the market and its ability to react to changes in fashion more quickly than can its foreign competitors. Also, as retailers consolidate and become more cost conscious, they are requiring more apparel

manufacturers to move towards a just-in-time delivery system, in which purchased apparel items are quickly replaced by the manufacturer rather than from a large inventory kept by the retailer. Through electronic data interchange—mainly using barcodes—information is quickly communicated to the manufacturers, providing information not only on inventory, but also about the desires of the public for fashion items.

Apparel firms have responded to growing competition by merging and moving into the retail market. They are also contracting out functions in addition to the production of garments—for example, the warehousing and order fulfillment functions—so that they can concentrate on their strengths of design and marketing. Such changes may help the apparel manufacturing industry to continue to supply the Nation's consumers with garments at acceptable cost and thus meet the growing competition.

Working Conditions

Working conditions depend on the age of the facility, the equipment used, and company policies. Cut and sew apparel workers work an average of 36.4 hours weekly, but overtime is common during periods of peak production. Some firms in the industry operate several shifts, and may require employees to work nights or weekends. As more expensive machinery is introduced, companies may add shifts to keep the machines from being idle.

Factories are generally clean, well lit, and well ventilated, but sewing areas may be noisy. Operators often sit for long periods and lean over machines. New ergonomically designed chairs and machines that allow workers to stand during operation are some of the means that firms use to minimize discomfort for production workers. Another concern for workers is injuries caused by repetitive motions. The implementation of modular units and specially designed equipment reduces potential health problems by lessening the stress of repetitive motions. In 2002, cases of work-related injury and illness in the apparel industry averaged 4.6 per 100 workers, lower than the 7.2 average in all manufacturing industries, and about the same as the rate for all industries.

The movement away from traditional piecework systems often results in a significant change in working conditions. Modular manufacturing involves teamwork, increased responsibility, and greater interaction among coworkers than do traditional assembly lines.

Travel is an important part of the job for many managers and designers, who oversee the design and production of the apparel. As more production moves abroad, foreign travel is becoming more common.

Employment

The apparel industry provided about 358,000 wage and salary jobs in 2002. As shown in table 1, employment is classified into three sub industries; apparel knitting mills, cut and sew apparel manufacturing, and accessories and other apparel manufacturing. Within the cut and sew apparel manufacturing sub industry, cut and sew apparel contractors held approximately 40 percent of all jobs and men's and women's cut and sew apparel manufacturing accounted for about 51 percent of employment.

About three-fourths of jobs in the apparel industry are found in nine States: Alabama, California, Georgia, New Jersey, New York, North Carolina, Pennsylvania, Tennessee, and Texas. The industry had about 14,000 establishments in 2002, with employment concentrated in large firms. In 2002, 2 out of 3 jobs were in establishments with 50 or more workers (chart).

Table 1. Percent distribution of establishments and employment in apparel manufacturing, 2002

Industry segment	Establishments	Employment
Total	100.0	100.0
Cut and sew apparel manufacturing	87.1	78.3
Accessories and other apparel manufacturing	7.3	7.5
Apparel knitting mills	5.6	14.2

Occupations in the Industry

Production workers account for about 70 percent of total employment in the industry. About 4 in 10 workers are sewing machine operators (table 2). The apparel industry also em-

Most employment in apparel manufacturing is in establishments with 50 or more workers

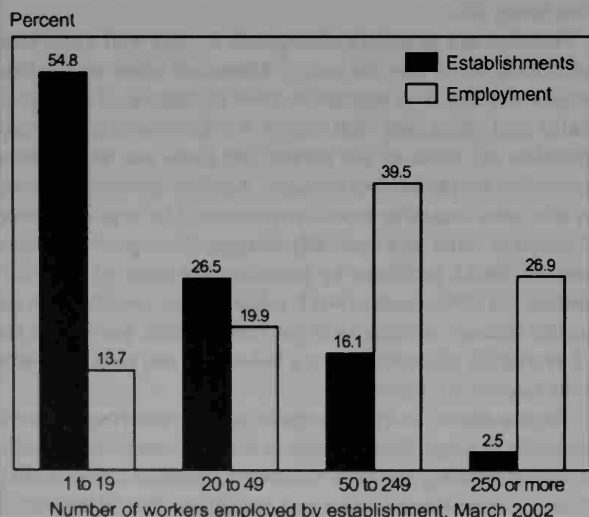


Table 2. Employment of wage and salary workers in apparel manufacturing by occupation, 2002 and projected change, 2002-10 (Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-10
	Number	Percent	
All occupations	358	100.0	-68.6
Management, business, and financial occupations	16	4.4	-66.9
Top executives	6	1.5	-67.9
Operations specialties managers	5	1.3	-66.4
Professional and related occupations	7	1.9	-66.2
Fashion designers	2	0.6	-64.78
Service occupations	4	1.2	-69.3
Sales and related occupations	10	2.7	-69.5
Sales representatives, wholesale and manufacturing, except technical and scientific products	4	1.2	-67.7
Office and administrative support occupations	40	11.2	-72.0
Bookkeeping, accounting, and auditing clerks	4	1.0	-72.75
Information and record clerks	6	1.7	-70.2
Shipping, receiving, and traffic clerks	9	2.5	-72.1
Stock clerks and order fillers	4	1.1	-74.7
Office clerks, general	4	1.2	-72.1
Installation, maintenance, and repair occupations	7	1.9	-61.8
Industrial machinery installation, repair, and maintenance workers	6	1.6	-61.4
Production occupations	249	69.6	-68.3
First-line supervisors/managers of production and operating workers	11	3.1	-66.8
Team assemblers	5	1.3	-59.7
Pressers, textile, garment, and related materials	10	2.8	-67.5
Sewing machine operators	147	41.1	-69.5
Sewers, hand	8	2.4	-67.1
Tailors, dressmakers, and custom sewers	3	1.0	-75.50
Textile cutting machine setters, operators, and tenders	9	2.5	-71.1
Textile knitting and weaving machine setters, operators, and tenders	9	2.5	-59.5
Fabric and apparel patternmakers	4	1.2	-72.1
All other textile, apparel, and furnishings workers	6	1.8	-64.9
Inspectors, testers, sorters, samplers, and weighers	12	3.5	-66.4
Helpers—Production workers	4	1.2	-69.9
Transportation and material moving occupations	25	7.0	-69.7
Laborers and freight, stock, and material movers, hand	9	2.5	-73.3
Packers and packagers, hand	11	3.1	-67.0

NOTE: May not add to totals due to omission of occupations with small employment.

loys a small number of workers in administrative support, material-moving, and managerial occupations.

Fashion designers are the artists of the apparel industry. They create ideas for a range of products including coats, suits, dresses, hats, and underwear. Fashion designers begin the pro-

cess by making rough sketches of garments or accessories, often using computer-assisted design (CAD) software. This software prints detailed designs from a computer drawing. It can also store fashion styles and colors that can be accessed and easily changed. Designers then create the pattern pieces that will be used to construct the finished garment. They measure and draw pattern pieces to actual size on paper. Then, they use these pieces to measure and cut pattern pieces in a sample fabric. Designers sew the pieces together and fit them on a model. They examine the sample garment and make changes until they get the effect they want. Some designers use assistants to cut and sew pattern pieces to their specifications.

Before sewing can begin, pattern pieces must be made, layouts determined, and fabric cut. *Fabric and apparel patternmakers* create the "blueprint" or pattern pieces for a particular apparel design. This often involves "grading," or adjusting the pieces for different sized garments. Grading once was a time-consuming job, but now it is quickly completed with the aid of a computer. *Markers* determine the best arrangement of pattern pieces to minimize wasted fabric. Traditionally, markers judged the best arrangement of pieces by eye; today, computers quickly help to determine the best layout.

The layout arrangement is then given to *cutters*. In less automated companies, cutters may use electric knives or cutting machines to cut pattern pieces. In more automated facilities, markers electronically send the layout to a computer-controlled cutting machine, and *textile cutting machine setters, operators, and tenders* monitor the machine's work.

Sewing machine operators assemble or finish clothes. Most sewing functions are specialized and require the operator to receive specific training. Although operators specialize in one function, the trend toward cross-training requires them to broaden their skills. *Team assemblers* perform all of the assembly tasks assigned to their team, rotating through the different tasks, rather than specializing in a single task. They also may decide how the work is to be assigned and how different tasks are to be performed.

Pressers receive a garment after it has been assembled. Pressers eliminate wrinkles and give shape to finished products. Most pressers use specially formed, foot-controlled pressing machines to perform their duties. Some pressing machines now have the steam and pressure controlled by computers. *Inspectors, testers, sorters, samplers, and weighers* inspect the finished product to ensure consistency and quality.

Training and Advancement

Most production workers are trained on the job. Although a high school diploma is not required, some employers prefer it. Basic math and computer skills are important for computer-controlled machine operators.

Cutters and pressers are trained on the job, while patternmakers and markers usually have technical or trade school training. All of these workers must understand textile characteristics and have a good sense of three-dimensional space. Traditional cutters need exceptional hand-eye coordination. Computers are becoming a standard tool for these occupations because patternmakers and markers increasingly design pattern

pieces and layouts on a computer screen. New entrants seeking these jobs should learn basic computer skills. Those running automatic cutting machines could need technical training, which is available from vocational schools.

Sewing machine operators must have good hand-eye coordination and dexterity, as well as an understanding of textile fabrics. They normally are trained on the job for a period of several weeks to several months, depending on their previous experience and the function for which they are training. Operators usually begin by performing simple tasks, working their way up to more difficult assemblies and fabrics as they gain experience.

Modular manufacturing requires operators to perform more than one function, so they usually are trained to perform several duties. In addition to this functional training, workers in a modular system may also be offered courses in the interpersonal and communication skills necessary to work as part of a team. Further, the added responsibility of self-managing their modules may lead these workers to receive training in problem-solving and management.

Advancement for sewing machine operators, however, is limited. Advancement often takes the form of higher wages as workers become more experienced. Experienced operators who have good people and organization skills may become supervisors. Operators with a high school diploma and some vocational school training have more chances for advancement.

Designers need a good sense of color, texture, and style. In addition, they must understand the construction and characteristics of specific fabrics, such as durability and stiffness. Many employers seek designers who know how to use computer-assisted design. This specialized training usually is obtained through a university or design school that offers 4-year or 2-year degrees in art, fine art, or fashion design. Many schools do not allow entry into a bachelor's degree program until a student has completed a year of basic art and design courses. Applicants may be required to submit drawings and other examples of their artistic ability. Formal training is also available in 2- and 3-year fashion design schools that award certificates or associate degrees. Graduates of 2-year programs generally qualify as assistants to designers.

Beginning designers usually receive on-the-job training. They normally need 1 to 3 years of training before they advance to higher level positions, such as assistant technical designer, pattern designer, or head designer. Sometimes fashion designers advance by moving to bigger firms. Some designers choose to move into positions in business or merchandising.

Those interested in engineering or production management need a bachelor's degree. Degrees in mechanical, chemical, or industrial engineering are common, but employers may also accept degrees in related studies. A few programs offer concentrations in apparel and textile production that focus on the unique characteristics and issues associated with apparel production. Universities offering these specializations generally are found in the South and Northeast.

Earnings

Average weekly earnings for production workers were \$334 in 2002, significantly lower than the overall \$619 per week in

manufacturing and \$506 in the entire private sector. Table 3 shows average weekly and hourly earnings in various segments of the apparel industry.

Table 3. Average earnings of nonsupervisory workers in apparel manufacturing, 2002

Industry segment	Weekly	Hourly
Total, private industry	\$506	\$14.95
Apparel Manufacturing	334	9.10
Apparel knitting mills	382	10.08
Accessories and other apparel	348	9.41
Cut and sew apparel	324	8.89

Earnings in selected occupations in apparel and other textile products appear in table 4. Traditionally, sewing machine operators are paid on a piecework basis determined by the quantity of goods they produce. Many companies are changing to incentive systems based on group performance that consider both the quantity and quality of the goods produced. A few companies pay production workers a salary.

Table 4. Median hourly earnings of the largest occupations in apparel manufacturing, 2002

Occupation	Apparel Manufacturing	All industries
First-line supervisors/managers of production and operating workers	\$14.27	\$20.64
Textile knitting and weaving machine setters, operators, and tenders	9.65	11.05
Textile cutting machine setters, operators, and tenders	9.48	9.77
Shipping, receiving, and traffic clerks	9.31	11.26
Pressers, textile, garment, and related materials	8.83	8.21
Team assemblers	8.60	10.90
Laborers and freight, stock, and material movers, hand	8.51	9.48
Sewers, hand	8.16	8.69
Packers and packagers, hand	8.07	8.03
Sewing machine operators	7.72	8.39

Relatively few workers in the apparel industry belong to unions. About 8 percent of apparel workers are union members or are covered by a union contract, compared with 15 percent for the economy as a whole. The major union in the apparel industry is the Union of Needletrades, Industrial, and Textile Employees (UNITE), which was formed in 1995 from the International Ladies' Garment Workers Union and the Amalgamated Clothing and Textile Workers Union.

Outlook

Wage and salary employment in the apparel industry is expected to decline 69 percent through 2012, compared with an increase of 16 percent for all industries combined. The expected decline translates into 245,000 lost jobs over the period—greater than the decrease for almost any other industry. Declining employment will be caused by growing imports, new automation, fierce cost-cutting pressures imposed

by retailers, international competition, and mergers and acquisitions. Nevertheless, some job openings will arise as experienced workers transfer to other industries or retire or leave the workforce for other reasons.

Changing trade regulations are the single most important factor influencing future employment patterns. Because the apparel industry is labor-intensive, it is especially vulnerable to import competition from nations in which workers receive lower wages. The protection provided to the domestic apparel industry over the past two decades will be significantly reduced in coming years, permitting more apparel imports. For example, starting in 2004, all quotas for apparel and textile products will be lifted among members of the World Trade Organization, which includes most U.S. trading partners, and, in particular, China. Because many U.S. firms will continue to move their assembly operations to low-wage countries, this trend is likely to affect the jobs of lower skilled machine operators most severely. It will not, however, have as adverse an effect on the demand for some of the presewing functions, such as designing and cutting, because much of the apparel will still be designed and cut in the United States.

New technology will increase the apparel industry's productivity, but, unlike other industries, the apparel industry is likely to remain labor intensive. The variability of cloth and the intricacy of the cuts and seams of the assembly process have been difficult to automate. Machine operators, therefore, will continue to perform most sewing tasks, and automated sewing will be limited to simple functions. In some cases, however, computerized sewing machines will increase the productivity of operators and reduce required training time.

Technology also is increasing the productivity of workers who perform other functions, such as designing, marking, cutting, and pressing. Computers and automated machinery will continue to raise productivity and reduce the demand for workers in these areas, but the decline will be moderated by growth in demand for the services of these workers generated by offshore assembly sites. The increasing rate at which fashions change also will boost demand for workers employed in those U.S.-based firms that have quick-response capabilities.

Continuing changes in the market for apparel goods will exert cost-cutting pressures that affect all workers in the apparel and textile industries. As consumers become more price conscious, retailers gain bargaining power over apparel producers, and increasing competition limits the ability of producers to pass on costs to consumers, apparel firms are likely to respond by relying more on foreign production and boosting productivity through investments in technology and new work structures. These responses will adversely affect employment of U.S. apparel workers.

The trend today is for apparel firms to merge or consolidate to remain competitive. This trend continues to drive down the number of firms in this industry. In the future, the apparel industry will be dominated by highly efficient, profitable organizations that have developed their dominance through well-recognized strategies that enable them to be among the lowest

cost producers of apparel. Consolidation and mergers are likely to result in layoffs of some workers.

Sources of Additional Information

Information about job opportunities in technical and design occupations in the apparel industry can be obtained from colleges offering programs in textile and apparel engineering, production, and design.

Information on many occupations in apparel manufacturing, including those listed below, appears in the 2004-05 edition of the *Occupational Outlook Handbook*:

- Designers
- Engineers
- Inspectors, testers, sorters, samplers, and weighers
- Textile, apparel, and furnishings occupations

Chemical Manufacturing, Except Pharmaceutical and Medicine Manufacturing

(NAICS 325, except 3254)

SIGNIFICANT POINTS

- Employment is projected to decline.
- Workers involved in production and installation, maintenance, and repair hold about half of all jobs.
- Persons with technical and advanced degrees will have the best opportunities.
- Production workers earn more than in most industries.

Nature of the Industry

Chemicals are an essential component of manufacturing, vital to industries such as construction, motor vehicles, paper, electronics, transportation, agriculture, and pharmaceuticals. Although some chemical manufacturers produce and sell consumer products such as soap, bleach, and cosmetics, most chemical products are used as intermediate products for other goods.

Chemical manufacturing is divided into seven segments, six of which are covered here: Basic chemicals; synthetic materials, including resin, synthetic rubber, and artificial and synthetic fibers and filaments; agricultural chemicals, including pesticides, fertilizer, and other agricultural chemicals; paint, coating, and adhesives; cleaning preparations, including soap, cleaning compounds, and toilet preparations; and other chemical products. The seventh segment, pharmaceutical and medicine manufacturing, is covered in a separate *Career Guide* statement.

The basic chemicals segment produces various petrochemicals, gases, dyes, and pigments. Petrochemicals are chemicals that contain carbon and hydrogen and are made primarily from petroleum and natural gas. The production of both organic and inorganic chemicals is discussed in this segment. Organic chemicals are used to make a wide range of products, such as dyes, plastics, and pharmaceutical products; however, the majority of these chemicals are used in the production of other chemicals. Industrial inorganic chemicals usually are made from salts, metal compounds, other minerals, and the atmosphere. In addition to solid and liquid chemicals, firms involved in inorganic chemical manufacturing also produce industrial gases such as oxygen, nitrogen, and helium. Many inorganic chemicals serve as processing ingredients in the manufacture of chemicals, but do not appear in the final products because they are used as reaction aids.

The synthetic materials segment produces a wide variety of finished products as well as raw materials. Some of these include common plastics materials such as polyethylene, polypropylene, polyvinyl chloride (PVC), and polystyrene, which can be made into products such as loudspeakers, toys, PVC pipes, and beverage bottles. Motor vehicle manufacturers are par-

ticularly large users of these products. Plastics materials used for mixing and blending resins on a custom basis also are produced in this industry segment.

The segment employing the fewest workers in the chemical industry is agricultural chemicals, which supplies farmers and home gardeners with fertilizers, herbicides, pesticides, and other agricultural chemicals. This segment also includes the formulation and preparation of agricultural and household pest control chemicals.

The paint, coating, and adhesive products segment includes firms making paints, varnishes, putties, paint removers, sealers, adhesives, glues, and caulking. The construction and furniture industries are large customers of this segment. Other customers range from individuals refurbishing their homes to businesses that need anticorrosive paints that can withstand high temperatures.

The cleaning preparations segment is the only one in which much of the production is geared directly toward consumers. This segment includes firms making soaps, detergents, and cleaning preparations. Cosmetics and toiletries, including perfume, lotion, and toothpaste, also are produced in this segment. Households and businesses use these products in many ways, cleaning everything from babies to bridges.

The other chemical products segment includes manufacturers of explosives, printing ink, film, toners, matches, and other miscellaneous chemicals. These products are used by consumers or in the manufacture of other products.

Chemicals generally are classified into two groups—commodity chemicals and specialty chemicals. Commodity chemical manufacturers produce large quantities of basic and relatively inexpensive compounds in large plants, often built specifically to make one chemical. Most of these basic chemicals are used to make more highly refined chemicals used in the production of everyday consumer goods by other industries. Specialty chemical manufacturers, on the other hand, produce smaller quantities of more expensive chemicals that are used less frequently. Specialty chemical manufacturers often supply larger chemical companies on a contract basis. Many traditional commodity chemical manufacturers are divided into two separate entities, one focused on commodities and the other on specialty chemicals.

Table 1. Distribution of wage and salary employment in chemical manufacturing, except pharmaceutical and medicine manufacturing, by detailed industry, 2002
(Employment in thousands)

Industry	Employment	Percent
Total, all industries	636.3	100.0
Basic chemical manufacturing	170.5	26.8
Soap, cleaning compound, and toilet preparation manufacturing	122.1	19.2
Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	114.3	18.0
Paint, coating, and adhesive manufacturing	72.3	11.4
Pesticide, fertilizer, and other agricultural chemical manufacturing	44.7	7.0
Other chemical product and preparation manufacturing	112.4	17.7

The diversity of products produced by the chemical industry also is reflected in its component establishments. For example, firms producing synthetic materials operated relatively large plants in 2002. This segment had 11 percent of the reporting establishments, yet employed 18 percent of those working in the chemical manufacturing industry. On the other hand, manufacturers of paints, coatings, and adhesive products had a greater number of establishments, each employing a much smaller number of workers. This segment comprised 16 percent of the establishments in the chemical industry, yet employed only 11 percent of all workers.

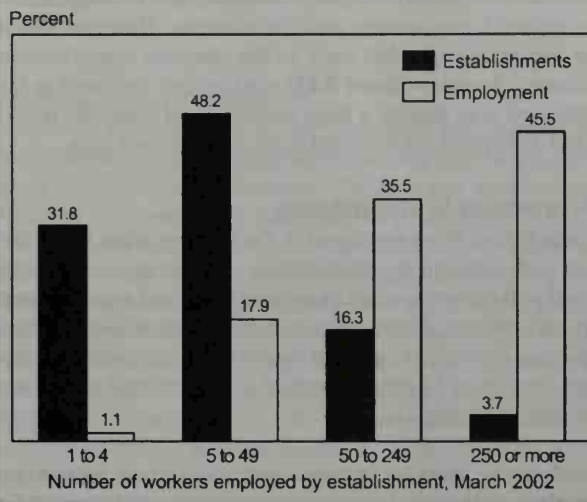
The chemical industry segments vary in the degree to which their workers are involved in production activities, administration and management, or research and development. Industries that make products such as cosmetics or paint that are ready for sale to the final consumer employ more administrative and marketing personnel. Industries that market their products mostly to industrial customers generally employ a greater proportion of precision production workers and a lower proportion of unskilled labor.

Chemical firms are concentrated in areas abundant with other manufacturing businesses, such as the Great Lakes region near the automotive industry, or the West Coast near the electronics industry. Chemical plants also are located near the petroleum and natural gas production centers along the Gulf Coast in Texas and Louisiana. Because chemical production processes often use water, and chemicals are primarily exported by ship all over the world, major industrial ports are another common location of chemical plants. California, Illinois, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Tennessee, and Texas had about half the establishments in the industry in 2002.

Working Conditions

Manufacturing chemicals usually is a continuous process; this means that, once a process has begun, it cannot be stopped when it is time for workers to go home. Split, weekend, and night shifts are common, and workers on such schedules usually are compensated with higher rates of pay. As a result, the average workweek in the chemical industry was 42.1 hours in

Chemical manufacturing, except drugs, employment is concentrated in establishments with 50 or more employees



2002, 2.0 hours longer than the average for nondurable manufacturing industries, and 8.4 hours longer than the average for all private industries. The industry employs relatively few part-time workers.

Most jobs in chemical manufacturing, except drugs, are in large establishments. The largest 20 percent of establishments that employed 50 or more workers in 2002 had over 80 percent of the industry's jobs (see chart). The plants usually are clean, although the continually running machines sometimes are loud and the interior of many plants can be hot. Hardhats and safety goggles are mandatory and worn throughout the plant.

Hazards in the chemical industry can be substantial, but they generally are avoided through strict safety procedures. Workers require protective gear and extensive knowledge of the dangers associated with the chemicals being handled. Body suits with breathing devices designed to filter out any harmful fumes are mandatory for work in dangerous environments.

In spite of the hazards of working with chemicals, extensive worker training on handling hazardous chemicals and chemical company safety measures have resulted in injury and illness rates for some segments of the chemical industry that are much lower than the average for the manufacturing sector. The chemical industry (including pharmaceuticals) reported just 3.3 cases of work-related injury or illness per 100 workers, compared with an average of 7.2 cases for all manufacturing industries in 2002.

Employment

The chemical and allied products industry employed about 636,000 wage and salary workers in 2002, about 4 percent of the total number employed in manufacturing. Most segments of the industry had substantial numbers of jobs, as shown in table 1.

Under the new North American Industry Classification System (NAICS), workers in research and development (R&D) establishments that are not part of a manufacturing facility are included in a separate industry—research and development in the physical, engineering, and life sciences. However, due to the importance of R&D work to the chemical manufacturing industry, chemical-related R&D workers are discussed in this statement even though a large proportion of chemical-related R&D workers is not included in the employment data.

Occupations in the Industry

About half of those employed in the industry work in production and installation, maintenance, and repair occupations. Another 9 percent worked in transportation and material-moving occupations. Eleven percent worked in management, business, and financial; 12 percent in office and administrative support; and about 13 percent worked in professional and related occupations (table 2).

Production. Workers in production occupations operate and fix plant machinery, transport raw materials, and monitor the production process. Improvements in technology gradually are increasing the level of plant automation, reducing the number of jobs in production occupations. Although high school graduates qualify for most entry-level production jobs, advancement into better paying jobs, requiring higher skills or more responsibility, is possible with on-the-job training and work experience or through additional vocational training at a 2-year technical college.

Chemical plant and system operators monitor the entire production process. From chemical ingredient ratios to chemical reaction rates, the operator is responsible for the efficient operation of the chemical plant. Chemical plant operators generally advance to these positions from among the most experienced production workers, usually after having acquired extensive experience and technical training in chemical production processes. Experienced operators sometimes advance to senior supervisory positions.

Industrial machinery mechanics and machinery maintenance workers repair equipment, install machines, or practice preventive maintenance in the plant. Workers advance to these jobs either through apprenticeships or formal vocational training, or by completing in-house training courses.

Inspectors, testers, sorters, samplers, and weighers assure that the production process runs efficiently and that products meet quality standards. They refer problems to plant operators or managers.

Packaging and filling machine operators and tenders wrap products and fill boxes to prepare the final product for shipment or sale to the wholesaler or consumer. Over half of these jobs are in the soap and cosmetics industry, due to the amount of packaging needed for this industry's consumer products.

Transportation and material-moving workers move materials around the plant using industrial trucks or deliver finished products to customers by truck. For these jobs, employers seek experienced workers with knowledge of chemical hazards, safety procedures, and regulations governing the transport of hazardous chemicals. Operation of

Table 2. Employment of wage and salary workers in chemical manufacturing, except drugs, by occupation, 2002 and projected change, 2002-12

(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	636	100.0	-16.7
Management, business, and financial occupations	68	10.7	-13.6
Top executives	14	2.1	-16.0
Marketing and sales managers	6	1.0	-7.7
Industrial production managers	8	1.3	-14.3
Business operations specialists	14	2.2	-12.1
Financial specialists	6	1.0	-14.2
Professional and related occupations	85	13.4	-15.3
Computer specialists	8	1.3	-10.8
Chemical engineers	9	1.4	-18.0
Drafters, engineering, and mapping technicians	8	1.2	-17.6
Chemists and materials scientists	14	2.2	-12.1
Chemical technicians	20	3.1	-16.9
Sales and related occupations	23	3.6	-11.6
Sales representatives, wholesale and manufacturing	18	2.8	-10.8
Office and administrative support occupations	74	11.7	-22.9
Bookkeeping, accounting, and auditing clerks	7	1.1	-24.6
Customer service representatives	8	1.3	-12.0
Shipping, receiving, and traffic clerks	12	1.8	-21.8
Secretaries and administrative assistants	12	1.9	-29.1
Office clerks, general	7	1.1	-23.8
Construction and extraction occupations	7	1.1	-13.8
Installation, maintenance, and repair occupations	52	8.1	-15.7
Industrial machinery mechanics	11	1.7	-10.3
Maintenance and repair workers, general	23	3.6	-16.9
Production occupations	266	41.8	-17.0
First-line supervisors/managers of production and operating workers	24	3.8	-15.1
Assemblers and fabricators	18	2.8	-16.0
Metal workers and plastic workers	23	3.5	-25.1
Textile, apparel, and furnishings occupations	12	1.8	-20.6
Chemical equipment operators and tenders	30	4.7	-17.1
Mixing and blending machine setters, operators, and tenders	31	4.9	-21.4
Inspectors, testers, sorters, samplers, and weighers	11	1.7	-12.0
Packaging and filling machine operators and tenders	27	4.2	-3.5
Helpers—Production workers	12	1.9	-16.6
Transportation and material moving occupations	56	8.9	-16.5
Truck drivers, heavy and tractor-trailer	8	1.2	-13.2
Industrial truck and tractor operators	10	1.6	-11.9
Laborers and freight, stock, and material movers, hand	13	2.0	-27.9
Packers and packagers, hand	11	1.7	-8.4

NOTE: May not add to totals due to omission of occupations with small employment.

industrial trucks and tractors can be learned with on-the-job training, but previous experience driving a truck and a commercial driver's license generally are required to operate a tractor-trailer carrying chemicals. Some jobs in transportation and material movement are open to workers without experience. Workers in these jobs move raw materials and finished products through the chemical plant and assist motor vehicle operators in loading and unloading raw materials and chemicals. They learn safe ways to handle chemicals on the job and develop skills that enable them to advance to other occupations.

Research and development. Most workers in research and development have at least a college degree, and many have advanced degrees.

Chemists and materials scientists carry out research in a wide range of activities, such as analysis of materials, preparation of new materials or modification of existing ones, study of process chemistry pathways for new or existing products, and formulations of cosmetics, household care products, or paints and coatings. They also try to develop new chemicals for specific applications and new applications for existing chemicals. The most senior chemists sometimes advance to management positions. Although chemical companies hire some chemists with bachelor's degrees, a master's or doctoral degree is becoming more important for chemist jobs.

Chemical engineers design equipment and develop processes for manufacturing chemicals on a large scale. Chemical research engineers design and conduct experiments to learn how processes behave and conduct research for potential new chemical products and processes. A bachelor's degree is essential for these jobs, and a master's degree may be preferred or required for some jobs.

Engineering and science technicians assist chemists and engineers in research activities and may conduct some research independently. Those with bachelor's degrees in chemistry or graduates of 2-year technical institutes usually fill these positions. Some graduates of engineering programs start as technicians until an opportunity to advance into an engineering position arises.

Administration and management. Most managers need a 4-year college degree in addition to experience in the industry. As in other highly technical industries, top managerial positions often are held by those with substantial technical experience. Employment in administrative support and managerial occupations is expected to decline as companies merge and consolidate operations.

Engineering managers conduct cost estimations, perform plant design feasibility studies, and coordinate daily operations. These jobs require a college degree in a technical discipline, such as chemistry or chemical engineering, and experience in the industry. Some employees advance from research and development positions to management positions.

Advertising, marketing, promotions, public relations, and sales managers promote sales of chemical products by informing customers of company products and services. A bachelor's degree in marketing, chemistry, or chemical engineering usually is required for these jobs.

Office and administrative support workers perform office functions such as secretarial duties, bookkeeping, material records processing, and other clerical duties. Training beyond high school and familiarity with computers is preferred for these occupations.

Training and Advancement

Despite recent reductions in the workforce, the chemical industry offers career opportunities for persons with varying levels of experience and education. Training and advancement differ for the three major categories of occupations.

Production workers may start as laborers or in other unskilled jobs and, with experience and training, advance into better paying positions that require greater skills or have greater responsibility. Substantial advancement is possible even within a single occupation. For example, chemical plant operators may move up through several levels of responsibility until they reach the highest paying operator job. Advancement in production occupations usually requires mastery of advanced skills. Such skills usually are the result of a combination of on-the-job training and formal training provided by the employer. Some workers advance into supervisory positions.

Most jobs in research and development require substantial technical education after high school, but opportunities exist for persons with degrees ranging from a 2-year associate degree up to a doctorate. Development of new products and the award of patents bring increases in pay and prestige but, after a point, advancement may require moving from research and development into management. Researchers usually are familiar with company objectives and production methods, which, combined with college education, equips them with many of the tools necessary for management positions.

Managerial jobs usually require a 4-year college degree, though some may require only a 2-year technical degree. Managers can advance into higher level jobs without additional formal training outside the workplace, although competition is keen. In general, advancement into the highest management ranks depends on experience and proven ability to handle responsibility in several functional areas. Among larger, multinational firms, international experience is important for career advancement. Also, industry restructuring has left fewer layers of management, intensifying competition for promotions.

Earnings

Earnings in the chemical industry are higher than average. The weekly earnings for all production workers in chemical manufacturing averaged \$755 in 2002, compared with \$619 in all manufacturing industries and \$506 throughout private industry. This was due, in part, to the chemical industry's practice of assigning more overtime and weekend work, which commands higher hourly rates.

Wages of workers in the chemical industry vary according to occupation, the specific industry segment, and the size of the production plant. Earnings by major occupation group are shown in table 3.

The principal unions representing chemical workers are the PACE (Paper, Allied-Industrial, Chemical, and Energy Workers) International Union and the International Chemical Workers Union. In 2002, almost 14 percent of chemical manufacturing workers were union members or covered by union contracts, compared with about 15 percent of all workers.

Table 3. Median hourly earnings of the largest occupations in chemical manufacturing, except drugs, 2002.

Occupation	Chemical manufacturing	All industries
Chemists	\$26.20	\$25.43
First-line supervisors/managers of production and operating workers	24.87	20.64
Chemical plant and system operators	21.18	21.12
Maintenance and repair workers, general	19.99	14.12
Chemical technicians	19.86	18.00
Chemical equipment operators and tenders	18.93	18.00
Inspectors, testers, sorters, samplers, and weighers	14.53	13.01
Mixing and blending machine setters, operators, and tenders	14.20	13.23
Packaging and filling machine operators and tenders	12.04	10.20
Team assemblers	10.55	10.90

Outlook

Although the chemical industry's output is expected to grow, employment in the chemicals manufacturing industry, excluding pharmaceuticals and medicine, is projected to decline by about 17 percent over the 2002-12 period, compared with 16-percent growth expected for the entire economy. The projected decline in chemical manufacturing employment can be attributed to trends affecting the U.S. and global economies. There are several factors that will influence chemical industry employment, such as more efficient production processes and increased plant automation, the state of the national and world economy, company mergers and consolidation, increased foreign competition, the shifting of production activities to foreign countries, and environmental health and safety concerns and legislation. Another trend in the chemical industry is the rising demand for specialty chemicals. Chemical companies are finding that, in order to remain competitive, they must differentiate their products and produce specialty chemicals, such as advanced polymers and plastics designed for customer-specific uses—for example, a durable body panel on an automobile.

Improvements in production technology have reduced the need for workers in production; installation, maintenance, and repair; and material-moving occupations, which account for large proportions of jobs in the chemical industry. The application of computerized controls in standard production, and the growing manufacture of specialty chemicals requiring precise, computer-controlled production methods, will reduce the

need for workers to monitor or directly operate equipment. Although production facilities will be easier to run with the increased use of computers, the new production methods will require workers with a better understanding of the use of the systems.

Foreign competition has been intensifying in most industries, and the chemical industry is no exception. The increase in international trade and rapidly expanding foreign production capabilities should intensify competition. Pressure to reduce costs and streamline production will result in mergers and consolidations of companies both within the United States and abroad. Mergers and consolidations are allowing chemical companies to increase profits by eliminating duplicate departments and shifting operations to locations in which costs are lowest. U.S. companies are expected to move some production activities to developing countries—those in East Asia and Latin America, for example—to take advantage of rapidly expanding markets.

The chemical industry invests billions of dollars yearly in technology to reduce pollution and clean up existing waste sites. Concerns about chemicals and the environment may spur producers to create chemicals with byproducts that are fewer or less dangerous, or that can be recycled or disposed of cleanly.

The factors affecting employment in the chemical manufacturing industry will impact different segments of the industry to varying degrees. The only segment projected to add jobs is the cleaning preparations, including soap, cleaning compounds, and toilet preparations segment, with an increase of about 3,200 jobs. The other chemical products segment is projected to lose about 33,000 jobs; the basic chemical manufacturing segment, about 31,000 jobs; and the synthetic materials segment, about 26,000 jobs.

Sources of Additional Information

Additional information on training and careers in the chemical manufacturing industry is available from:

- American Chemical Society, 1155 16th St. NW., Washington, DC 20036. Internet: <http://www.acs.org>
- American Institute of Chemical Engineers, 3 Park Ave., New York, NY 10016-5991. Internet: <http://www.aiche.org>

Detailed information on many occupations in the chemical manufacturing industry, including the following, may be found in the 2004-05 edition of the *Occupational Outlook Handbook*.

- Chemical engineers
- Chemists and materials scientists
- Industrial production managers
- Inspectors, testers, sorters, samplers, and weighers
- Material-moving occupations
- Science technicians

Computer and Electronic Product Manufacturing

(NAICS 334)

SIGNIFICANT POINTS

- Employment is projected to decline 12 percent over the 2002-12 period, mainly due to productivity improvements.
- The industry is characterized by significant research and development activity and rapid technological change.
- Professional and related personnel account for 3 out of 10 workers.

Nature of the Industry

The computer and electronic product manufacturing industry produces computers, computer-related products such as printers, communications equipment, and home electronic equipment, as well as a wide range of goods used for both commercial and military purposes. In addition, many electronics products or components are incorporated into other industries' products, such as cars, toys, and appliances.

Products manufactured in this industry include computers and computer storage devices, such as disk drives, and computer peripheral equipment, such as printers and scanners; communications equipment, such as wireless telephones and telephone switching equipment; consumer electronics, such as televisions and audio equipment; and military electronics, such as radar, communications equipment, guidance for "smart" bombs, and electronic navigation equipment. This industry also includes the manufacture of semiconductors—silicon or computer "chips," or integrated circuits—which constitute the heart of computers and many other advanced electronic products. Two of the most significant types of computer chips are microprocessors, which make up the central processing system of computers, and memory chips, which store information. Technological innovation characterizes this industry more than most others and, in fact, drives much of the industry's production. Many new products reflect a convergence of technologies. Such products include digital cameras and hand-held devices that permit wireless Internet access.

The computer and electronic product manufacturing industry differs from other manufacturing industries in that production workers account for a much lower proportion of all workers. The unusually rapid pace of innovation and technological advancement requires a high proportion of engineers, engineering technicians, and other highly technical workers to continually develop and produce new products. Likewise, the importance of promoting and selling the products manufactured by the various segments of this industry requires knowledgeable marketing and sales workers. American companies manufacture and assemble many products abroad because of lower production costs and new trade agreements.

Companies producing intermediate components and finished goods frequently locate near each other because doing so allows easier access to recent innovations. Electronic products contain many components—and sometimes even major parts, such as integrated circuits—that often are purchased from other manufacturers. As a result of having the skilled workforce that

fosters product improvement, some areas of the country have become centers of the electronics industry. The most prominent of these centers is "Silicon Valley," a concentration of integrated circuit, software, and computer firms in California's Santa Clara Valley, near San Jose; however, there are electronics manufacturing plants throughout the country.

To a large extent, electronics manufacturing has become truly global, and it is difficult to characterize many companies and their products as American or foreign. The movement of foreign companies to manufacture some goods in the United States does not change the fact that many products are being designed in one country, manufactured in another, and assembled in a third. Highly sensitive and sophisticated products such as semiconductors and computers are being designed and manufactured in the United States, for example, but it remains likely that other parts of final products, such as the keyboards and outer casings, are made somewhere else and shipped to yet another site for final assembly.

Although some of the companies in this industry are very large, most are actually small. The history of innovation in the industry explains the startup of many small firms. Some companies are involved in design or research and development (R&D), whereas others may simply manufacture components, such as computer chips, under contract for others. Often, an engineer or physicist will have an innovative idea and set up a new company to develop the product. Although electronic products can be very sophisticated, it has been possible to manufacture many electronic products or components (not necessarily finished products) with a relatively small investment. Furthermore, investors often are willing to put their money behind new companies in this industry because of the history of large paybacks from some very successful companies. Success always will depend on innovation, and, although investment costs are rising, there should continue to be opportunities to develop good ideas.

The rapid pace of innovation in electronics technology makes for a constant demand for newer and faster products and applications. This demand puts a greater emphasis on R&D than is typical in most manufacturing operations. Being the first firm to market a new or better product can mean success for both the product and the firm. Even for many relatively commonplace items, R&D continues to result in better, cheaper products with more desirable features. For example, a company that develops a new kind of computer chip to be used in many

brands of computers can earn millions of dollars in sales until a competitor is able to copy the technology or develop a better chip. Many employees, therefore, are research scientists, engineers, and technicians whose job it is to continually develop and improve products.

The product design process includes not only the initial design, but also development work, which ensures that the product functions properly and can be manufactured as inexpensively as possible. When a product is manufactured, the components are assembled, usually by soldering them to a printed circuit board. Often tedious, hand assembly requires both good eyesight and coordination, as many of the parts are very small. However, because of the cost and precision involved, assembly and packaging are becoming highly automated.

Working Conditions

In general, computer and electronics manufacturing enjoys relatively good working conditions, even for production workers. In contrast to those in many other manufacturing industries, production workers in this industry usually work in clean and relatively noise-free environments. Computer chips are manufactured in "clean rooms," in which the air is filtered and workers wear special garments to prevent any dust from getting into the air. A speck of dust will ruin a computer chip.

In 2002, the rates of work-related injuries and illness per 100 full-time workers were 1.9 in computer and office equipment, 2.1 in communications equipment, 3.1 in electronic components and accessories, 5.5 in household audio and video equipment, and 1.5 in search and navigation equipment. These rates were, with one exception, lower than the 5.3 average for the private sector. However, some jobs in this industry may have risks. For example, some workers who fabricate integrated circuits and other components may be exposed to potentially hazardous chemicals, and working with small parts may cause eyestrain.

Most employees work regular 40-hour weeks, but pressure to develop new products ahead of competitors may result in some research and development personnel working extensive overtime to meet deadlines. The competitive nature of the industry makes for an exciting, but sometimes stressful, work environment—especially for those in technical and managerial occupations.

Employment

The computer and electronic product manufacturing industry employed 1.5 million wage and salary workers in 2002 (table 1). Few workers were self-employed.

The industry comprised about 21,000 establishments in 2002, many of which were small, employing only one or a few workers. Large establishments of 250 workers or more employed the majority—63 percent—of the industry's workforce (see chart).

Under the new North American Industry Classification System (NAICS), workers in R&D establishments that are not part of a manufacturing facility are included in a separate industry—research and development in the physical, engineering, and life sciences. However, due to the importance of R&D work to the computer and electronic product manufacturing industry, computer and electronic product-related R&D is discussed in this statement even though a large proportion of the associated workers are not included in the employment data.

Table 1. Distribution of wage and salary employment in computer and electronic product manufacturing by industry segment, 2002

(Employment in thousands)

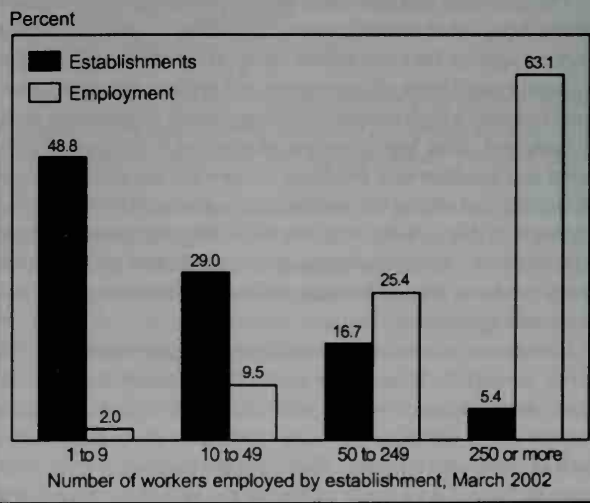
Industry segment	Employment	Percent
Total, computer and electronic product manufacturing	1,521.2	100.0
Semiconductor and other electronic components	531.4	34.9
Navigational, measuring, electromedical, and control instruments	450.6	29.6
Computer and peripheral equipment	249.8	16.4
Communications equipment	190.9	12.5
Manufacturing and reproducing magnetic and optical media	56.9	3.7
Audio and video equipment	41.6	2.8

Occupations in the Industry

Given the importance of R&D to the industry, it is not surprising that a large proportion—about 3 in 10—of all workers are in professional and related occupations (table 2). About 12 percent of these are engineers—predominately *electrical and electronics engineers* and *computer hardware engineers*, but also including many *industrial* and *mechanical engineers*. These workers develop new products and devise better, more efficient production methods. Engineers may coordinate and lead teams developing new products. Others may work with customers to help them make the best use of the products. *Computer systems analysts*, *database administrators*, and *computer scientists* are employed throughout the industry as both development and production methods become more computerized. Other professionals include *mathematical* and *physical scientists*, and *technical writers*.

About 6 percent of workers are *engineering technicians*, many of whom work closely with engineers. They help develop

Most jobs in computer and electronic product manufacturing are in establishments employing 250 or more workers



new products, work in production areas, and sometimes help customers install, maintain, and repair equipment. They also may test new products or processes to make sure everything works correctly.

Despite the relatively high proportion of professional and technical workers in electronics manufacturing, more than 3 out of 10 employees are production workers. Many are assemblers, who place and solder components on circuit boards, or assemble and connect the various parts of electronic devices. *Semiconductor processors* initiate and control the many automated steps in the process of manufacturing integrated circuits or computer chips. *Electrical and electronic equipment assemblers* are responsible for putting together products, such as computers and appliances, telecommunications equipment, and even missile control systems. Some assemblers are highly skilled and require significant experience and training to assemble major components. A skilled assembler may put together an entire subassembly, or even an entire product, especially when products are made in relatively small numbers. Other, less skilled assemblers often work on a production line, attaching one or a few parts and continually repeating the same operation. Increasingly, as production work becomes more automated, assemblers and other production workers monitor the machinery that actually does the assembly work. *Inspectors, testers, sorters, samplers, and weighers* use sophisticated testing machinery to ensure that devices operate as designed.

About 14 percent of workers in the industry are in management, business, and financial operations occupations. In this industry, top management is much more likely to have a technical background than are its counterparts in other industries. This is especially true in smaller companies, which often are founded by engineers, computer scientists, or other technical professionals.

About 14 percent of workers in this industry hold office and administrative support or sales and related jobs. Sales positions require technical knowledge and abilities and, as a result, engineers and technicians often may find opportunities in sales or sales support.

Training and Advancement

Workers with different levels of education find employment opportunities in the computer and electronic product manufacturing industry. Entry to engineering occupations generally requires at least a bachelor's degree in engineering, although those with 4-year degrees in physical science, computer science, or other technical areas can sometimes qualify as well. Some positions, however, may require a master's degree or higher, or relevant work experience. Computer systems analysts or scientists usually need a degree in computer science or a related field and, in many cases, they also must have considerable programming experience. Because companies often are founded by professionals with technical backgrounds, opportunities for advancement into executive or managerial positions may arise for experienced workers who keep up with rapid changes in technology and possess the business expertise necessary to succeed in the rapidly changing economy.

Training for engineering technicians is available from a number of sources. Although most employers prefer graduates of 2-year postsecondary training schools—usually technical in-

Table 2. Employment of wage and salary workers in computer and electronic product manufacturing by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,521	100.0	-12.4
Management, business, and financial occupations	218	14.3	-6.6
Top executives	27	1.7	-7.2
Marketing and sales managers	20	1.3	-3.3
Industrial production managers	16	1.0	-7.1
Engineering managers	28	1.8	-8.2
Buyers and purchasing agents	21	1.4	-10.4
Financial specialists	24	1.5	-8.9
Professional and related occupations	476	31.3	-7.7
Computer programmers	15	1.0	-23.4
Computer software engineers, applications	35	2.3	-4.9
Computer software engineers, systems software	41	2.7	-0.6
Computer support specialists	18	1.2	-4.0
Computer hardware engineers	28	1.8	-16.2
Electrical engineers	37	2.4	-13.5
Electronics engineers, except computer	38	2.5	-6.5
Industrial engineers	24	1.6	-7.6
Mechanical engineers	21	1.4	-12.4
Engineering technicians, except drafters	92	6.1	-5.8
Life, physical, and social science occupations	17	1.1	-11.0
Sales and related occupations	45	2.9	-6.6
Sales representatives, wholesale and manufacturing	27	1.8	-6.9
Office and administrative support occupations	170	11.2	-16.9
Financial clerks	19	1.2	-19.3
Customer service representatives	16	1.0	-3.5
Production, planning, and expediting clerks	20	1.3	-2.2
Shipping, receiving, and traffic clerks	22	1.4	-18.0
Secretaries and administrative assistants	30	2.0	-21.3
Office clerks, general	16	1.0	-21.0
Installation, maintenance, and repair occupations	44	2.9	-7.3
Electrical and electronic equipment mechanics, installers, and repairers	15	1.0	-9.9
Industrial machinery installation, repair, and maintenance workers	20	1.3	-6.7
Production occupations	519	34.1	-18.8
First-line supervisors/managers of production and operating workers	35	2.3	-6.0
Electrical and electronic equipment assemblers	160	10.5	-27.8
Electromechanical equipment assemblers	22	1.4	-20.6
Team assemblers	72	4.7	-21.3
Machinists	16	1.0	-9.5
Inspectors, testers, sorters, samplers, and weighers	43	2.8	-15.6
Semiconductor processors	44	2.9	-12.7
Transportation and material moving occupations	35	2.3	-9.6
Laborers and material movers, hand	27	1.8	-11.4

NOTE: May not add to totals due to omission of occupations with small employment.

stitutes or junior colleges—training in the U.S. Armed Forces or through proprietary schools also may meet employer requirements. Engineering technicians should have an aptitude for math and science. Entry-level technicians may begin working with a more experienced technician or engineer. Advancement opportunities for experienced technicians may include supervisory positions or movement into other production and inspection operations.

Though assembly workers generally need only a high school diploma, assemblers in the computer and electronic product manufacturing industry may need more specialized training or experience than do workers in other manufacturing industries. Precision assembly work can be extremely sophisticated and complex, and some precision assembly jobs may even require formal technical training. A 1-year certificate in semiconductor technology is good preparation for semiconductor processor operator positions; for more highly skilled technician positions, an associate degree in electronics technology or a related field is necessary. Again, advancement opportunities depend not only on work experience, but also on the level of technical training and the ability to keep up with changing technology.

Earnings

In general, earnings in the computer and electronic product manufacturing industry are high, although this is partly because many of the lower wage production jobs have been automated or exported to other countries. Average weekly earnings of all production or nonsupervisory workers in the industry were \$643, higher than the average of \$506 for all industries in 2002 (table 3).

Table 3. Average earnings of nonsupervisory workers in the computer and electronic product manufacturing industry, 2002

Industry segment	Weekly	Hourly
Total, private industry	\$506	\$14.95
Computer and electronic products manufacturing	643	16.19
Computer and peripheral equipment	799	19.64
Search, detection, and navigation instruments	732	18.37
Electronic instruments	657	16.65
Semiconductors and electronic components	611	15.32
Communications equipment	601	15.69
Audio and video equipment	508	13.28

Earnings in selected occupations in several components of the computer and electronic product manufacturing industry in 2002 appear in table 4.

Outlook

Wage and salary employment in the computer and electronic product manufacturing industry is expected decline by 12 percent between 2002 and 2012, compared with a 16 percent projected increase in all industries. Although the output of this industry is projected to increase more rapidly than that of any other industry, employment will still decline as a result of con-

Table 4. Median hourly earnings of the largest occupations in computer and electronic product manufacturing, 2002.

Occupation	Computer and electronic product manufacturing	All industries
Computer software engineers, systems software	\$38.36	\$35.60
Computer software engineers, applications	37.53	34.09
Electronics engineers, except computer	34.15	33.62
Electrical engineers	34.10	32.78
First-line supervisors/managers of production and operating workers	22.62	20.64
Electrical and electronic engineering technicians	19.04	20.65
Inspectors, testers, sorters, samplers, and weighers	13.55	13.01
Semiconductor processors	13.16	13.14
Electrical and electronic equipment assemblers	11.19	11.03
Team assemblers	10.77	10.90

tinued rapid productivity growth—the ability of the industry to produce more and better products with fewer employees. Employment also will be adversely affected by continued increases in imports of electronic and computer products, and by a more recent trend—outsourcing of some professional functions, such as computer programming and engineering, to lower-wage countries. Despite the overall projected decrease in employment, the technological revolutions taking place in computers, semiconductors, and telecommunications, as well as the need to replace the many workers who leave the industry due to retirements or other reasons, should continue to provide many employment opportunities in this industry, especially in research and development. Products of this industry, especially powerful computer chips, will continue to enhance productivity in all areas of the economy.

The projected change in employment over the 2002-12 period varies by industry segment (table 5). Although demand for computers should remain relatively strong worldwide, employment is expected to decline 27 percent in computers and peripheral equipment and 15 percent in semiconductor and other electronic component manufacturing due to the introduction of new technology and automated manufacturing processes, and due to a slowdown in growth of output in these segments from previously high levels. These segments also will continue to face strong import competition. Employment in navigational, measuring, electromedical, and control instruments manufacturing also is expected to decrease 12 percent due to automation of the production of increasingly sophisticated equipment. Employment in audio and video equipment manufacturing also is expected to decrease, by 8 percent, largely due to continued import competition as well as productivity improvements. However, employment in communications equipment manufacturing is expected to increase 5 percent due to strong demand and rapid technological developments such as wireless phones. Ownership of wireless phones has grown quickly in recent years; continuing improvements in quality and services should lead to

even greater growth between 2002 and 2012. The only other segment expected to increase employment, by 11 percent, is the manufacturing and reproduction of magnetic and optical media.

Table 5. Projected employment change in computer and electronic product manufacturing by industry segment, 2002-12

Industry segment	Percent change
Total, computer and electronic product manufacturing	-12.4
Computer and peripheral equipment	-27.1
Communications equipment	5.5
Audio and video equipment	-7.7
Semiconductor and other electronic components	-14.9
Navigational, measuring, electromedical, and control instruments	-12.2
Manufacturing and reproducing magnetic and optical media ...	11.1

Among occupations in the computer and electronic product manufacturing industry, there should be a smaller decrease in employment among professional and related occupations than most other occupations in the industry. However, use of the Internet and other new forms of communication makes it possible for engineers and other professionals working in other countries to do much design and other work that previously was done in this country. Some of these workers are directly employed by U.S. companies and others work for contractors engaged by domestic companies. Because the earnings of professional workers in many countries are much less than earnings in this country, the trend toward hiring foreign workers undoubtedly will accelerate, especially as companies gain more experience and confidence in the use of these workers. While this trend undoubtedly will negatively affect professional worker employment, there still will be numerous jobs in this country that cannot be exported.

Employment of production occupations is expected to decline more rapidly than that of the industry as a whole, as more jobs are lost to technological innovation. However, the numbers of semiconductor processors will decline at a slower rate than that of other production occupations.

The computer and electronic product manufacturing industry is characterized by rapid technological advances and has grown faster than most other industries over the past several decades, although rising costs, imports, and the rapid pace of innovation continue to pose challenges. Certain segments of the industry and individual companies often experience problems. For example, the industry occasionally undergoes severe downturns, and individual companies can run into trouble—even those in

segments of the industry doing well—because they have not kept up with the latest technological developments or because they have erred in deciding which products to manufacture. Such uncertainties can be expected to continue. In addition, the intensity of foreign competition and the future role of imports remain difficult to project. Import competition has wiped out major parts of the domestic consumer electronics industry, and future effects of import competition depend on trade policies and market forces. The industry is likely to continue to encounter strong competition from imported electronic goods and components from countries throughout Asia and Europe.

As defense expenditures are expected to increase, sales of military electronics, and important segment of the industry, will likely pick up. Furthermore, firms will continue developing new products, creating large new markets as they have in the past. Smaller, more powerful computer chips are continually being developed and incorporated into an even wider array of products, and the semiconductor content of all electronic products will continue to increase. The growth of digital technology, artificial intelligence, multimedia applications, and the expansion of the Internet and demand for global information networking will continue to create new opportunities.

Sources of Additional Information

Information on the electronics industry, including publications, salary surveys, and education and training, is available from:

- American Electronics Association, The Center for Workforce Excellence, 5201 Great America Pkwy., Suite 520, Santa Clara, CA 95054.
Internet: <http://www.aeanet.org>

For information on technology and other aspects of the electronics industry, contact:

- The Electronic Industries Alliance, 2500 Wilson Blvd., Arlington, VA 22201. Internet: <http://www.eia.org>

Information on these occupations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Assemblers and fabricators
- Computer hardware engineers
- Computer software engineers
- Computer systems analysts, database administrators, and computer scientists
- Electrical and electronics engineers, except computer
- Engineering and natural sciences managers
- Engineering technicians
- Semiconductor processors

Food Manufacturing

(NAICS 311)

SIGNIFICANT POINTS

- The industry has a high incidence of injury and illness; meat packing plants have the highest incidence among all food manufacturing industries.
- Production workers account for more than half of all jobs.
- Most jobs require little formal education or training; many can be learned in a few days.

Nature of the Industry

Workers in the food manufacturing industry link farmers and other agricultural producers with consumers. They do this by processing raw fruits, vegetables, grains, meats, and dairy products into finished goods ready for the grocer or wholesaler to sell to households, restaurants, or institutional food services.

Food manufacturing workers perform tasks as varied as the many foods we eat. For example, they slaughter, dress, and cut meat or poultry; process milk, cheese, and other dairy products; can and preserve fruits, vegetables, and frozen specialties; manufacture flour, cereal, pet foods, and other grain mill products; make bread, cookies, and other bakery products; manufacture sugar and candy and other confectionery products; process shortening, margarine, and other fats and oils; and prepare packaged seafood, coffee, potato and corn chips, and peanut butter. Although this list is long, it is not exhaustive—food manufacturing workers also play a part in delivering numerous other food products to our tables.

Table 1 shows that about 34 percent of all food manufacturing workers are employed in plants that slaughter and process animals, and another 19 percent work in establishments that make bakery goods. Seafood product preparation and packaging, the smallest sector of the food manufacturing industry, accounts for only about 3 percent of all jobs.

Working Conditions

Many production jobs in food manufacturing involve repetitive, physically demanding work. Food manufacturing workers are highly susceptible to repetitive strain injuries to hands, wrists, and elbows. This type of injury is especially common in meat-processing and poultry-processing plants. Production workers often stand for long periods and may be required to lift heavy objects or use cutting, slicing, grinding, and other potentially dangerous tools and machines.

In 2002, there were 9.3 cases of work-related injury or illness per 100 full-time food manufacturing workers, much higher than the rate of 5.3 cases for the private sector as a whole. Injury rates vary significantly among specific food manufacturing industries, ranging from a low of 3.8 per 100 workers in flavoring extracts and syrups plants to 14.9 per 100 in meat packing plants, the highest rate in food manufacturing.

In an effort to reduce occupational hazards, many plants have redesigned equipment, increased the use of job rotation, allowed longer or more frequent breaks, and developed training pro-

Table 1. Employment in food manufacturing by industry segment, 2002 and projected change, 2002-12
(Employment in thousands)

Industry segment	2002 Employment	2002-12 Percent change
Total employment	1,525.2	4.7
Animal slaughtering and processing	520.3	15.4
Bakeries and tortilla manufacturing	294.6	3.0
Fruit and vegetable preserving and specialty food manufacturing	181.6	-1.1
Other food manufacturing	151.6	2.4
Dairy product manufacturing	136.9	-9.3
Sugar and confectionery product manufacturing	83.1	-3.3
Grain and oilseed milling	61.9	-1.0
Animal food manufacturing	51.5	1.0
Seafood product preparation and packaging	43.7	-8.0

grams in safe work practices. Although injury rates remain high, training and other changes have reduced those rates. Some workers wear protective hats, gloves, aprons, and shoes. In many industries, uniforms and protective clothing are changed daily for sanitary reasons.

Because of the considerable mechanization in the industry, most food manufacturing plants are noisy, with limited opportunities for interaction among workers. In some highly automated plants, "hands-on" manual work has been replaced by computers and factory automation, resulting in less waste and higher productivity. While much of the basic production—such as trimming, chopping, and sorting—will remain labor intensive for many years to come, automation is increasingly being applied to various functions, including inventory control, product movement, packing, and inspection.

Working conditions also depend on the type of food being processed. For example, some bakery employees work at night or on weekends and spend much of their shift near ovens that can be uncomfortably hot. In contrast, workers in dairies and meat-processing plants work typical daylight hours and may experience cold and damp conditions. Some plants, such as those producing processed fruits and vegetables, operate on a seasonal basis, so workers are not guaranteed steady, year-round employment and occasionally travel from region to region seeking work. These plants are increasingly rare, however, as the industry continues to diversify and manufacturing plants produce alternate foods during otherwise inactive periods.

Employment

In 2002, the food manufacturing industry provided about 1.5 million jobs. Almost all employees are wage and salary workers, but a few food manufacturing workers are self-employed. In 2002 about 29,000 establishments manufactured food, over 80 percent employing fewer than 50 workers (see chart). Nevertheless, establishments employing 250 or more workers accounted for 55 percent of all jobs.

The employment distribution in this industry is widely varied. Animal slaughtering and processing employs the largest proportion of workers. Economic changes in livestock farming and slaughtering plants have changed the industry. Increasingly, fewer farms are producing the vast majority of livestock in the United States. Today, there is a smaller number of much larger meat-processing plants, owned by fewer companies—a development that has tended to concentrated employment in a few locations.

Food manufacturing workers are found in all States, although some sectors of the industry are concentrated in certain parts of the country. For example, California, Illinois, Iowa, Pennsylvania, and Texas employ more than a quarter of workers in animal slaughtering and processing. Wisconsin employed one-third of all cheese manufacturing workers. California accounts for one-fifth of fruit and vegetable preserving and specialty food manufacturing workers.

Occupations in the Industry

The food manufacturing industry employs many different types of workers. More than half are production workers, including skilled precision workers and less-skilled machine operators and laborers (table 2). Production jobs require manual dexterity, good hand-eye coordination, and in some sectors of the industry, strength.

Red meat production is the most labor-intensive food-processing operation. Animals are not uniform in size, and *slaughterers and meatpackers* must slaughter, skin, eviscer-

ate, and cut each carcass into large pieces. They usually do this work by hand, using large, heavy power saws. They also clean and salt hides and make sausage. *Meat, poultry, and fish cutters and trimmers* use handtools to break down the large primary cuts into smaller sizes for shipment to wholesalers and retailers. They use knives and other handtools to eviscerate, split, and bone chickens and turkeys.

Bakers mix and bake ingredients according to recipes to produce breads, cakes, pastries, and other goods. Bakers produce goods in large quantities, using mixing machines, ovens, and other equipment.

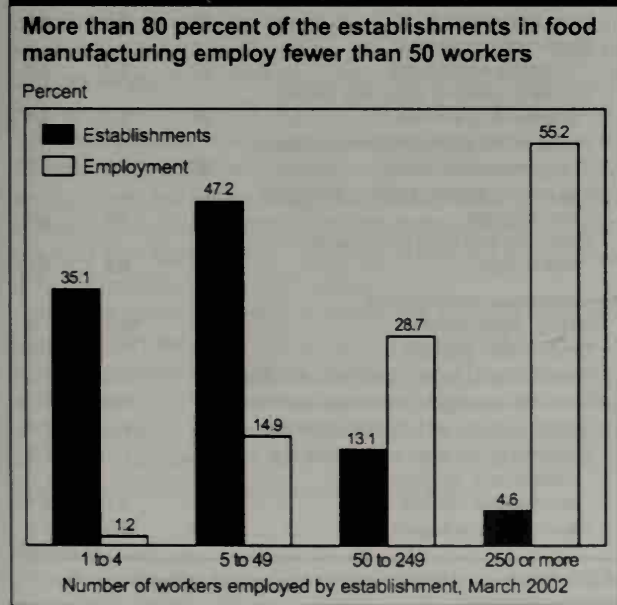
Many food manufacturing workers use their hands or small handtools to do their jobs. *Cannery workers* perform a variety of routine tasks—such as sorting, grading, washing, trimming, peeling, or slicing—in the canning, freezing, or packing of food products. *Hand food decorators* apply artistic touches to prepared foods. *Candy molders* and *marzipan shapers* form sweets into fancy shapes by hand.

With increasing levels of automation in the food manufacturing industry, a growing number of workers operate machines. For example, *food batchmakers* operate equipment that mixes, blends, or cooks ingredients used in manufacturing various foods, such as cheese, candy, honey, and tomato sauce. *Dairy-processing equipment operators* process milk, cream, cheese, and other dairy products. *Cutting and slicing machine operators* slice bacon, bread, cheese, and other foods. *Mixing and blending machine operators* produce dough batters, fruit juices, or spices. *Crushing and grinding machine operators* turn raw grains into cereals, flour, and other milled-grain products, and they produce oils from nuts or seeds. *Extruding and forming machine operators* produce molded food and candy, and *casing finishers* and *stuffers* make sausage links and similar products. *Bottle packers* and *bottle fillers* operate machines that fill bottles and jars with preserves, pickles, and other foodstuffs.

Food cooking machine operators and tenders steam, deep fry, boil, or pressure cook meats, grains, sugar, cheese, or vegetables. *Food and tobacco roasting, baking, and drying machine operators and tenders* operate equipment that roasts grains, nuts, or coffee beans, and tend ovens, kilns, dryers, and other equipment that removes moisture from macaroni, coffee beans, cocoa, and grain. *Baking equipment operators* tend ovens that bake bread, pastries, and other products. Some foods—ice cream, frozen specialties, and meat, for example—are placed in freezers or refrigerators by *cooling and freezing equipment operators*. Other workers tend machines and equipment that clean and wash food or food-processing equipment. Some machine operators also clean and maintain machines and perform other duties such as checking the weight of foods.

Many other workers are needed to keep food manufacturing plants and equipment in good working order. *Industrial machinery mechanics* repair and maintain production machines and equipment. *Maintenance repairers* perform routine machinery maintenance, such as changing and lubricating parts. Specialized mechanics include *heating, air-conditioning, and refrigeration mechanics and installers*, *farm equipment mechanics*, and *diesel engine specialists*.

Still other workers directly oversee the quality of the work and of final products. *Supervisors* direct the activities of produc-



tion workers. *Graders and sorters* of agricultural products, *production inspectors*, and *quality control technicians* evaluate foodstuffs before, during, or after processing.

Food may spoil if not properly packaged and promptly delivered, so packaging and transportation employees play a vital role in the industry. Among these are *freight, stock, and material movers*, who manually move materials; *hand packers* and *packagers*, who pack bottles and other items as they come off the production line; and *machine feeders and offbearers*, who feed materials into machines and remove goods from the end of the production line. *Industrial truck and tractor operators* drive gasoline or electric-powered vehicles equipped with forklifts, elevated platforms, or trailer hitches to move goods around a storage facility. *Truck drivers* transport and deliver livestock, materials, or merchandise, and may load and unload trucks. *Driver/sales workers* drive company vehicles over established routes to deliver and sell goods, such as bakery items, beverages, and vending machine products.

The food manufacturing industry also employs a variety of managerial and professional workers. Managers include *top executives*, who make policy decisions; *industrial production managers*, who organize, direct, and control the operation of the manufacturing plant; and *advertising, marketing, promotions, public relations, and sales managers*, who direct advertising, sales promotion, and community relations programs.

Engineers, scientists, and technicians are becoming increasingly important as the food manufacturing industry implements new automation. These workers include *industrial engineers*, who plan equipment layout and workflow in manufacturing plants, emphasizing efficiency and safety. Also, *mechanical engineers* plan, design, and oversee the installation of tools, equipment, and machines. *Chemists* perform tests to develop new products and maintain quality of existing products. *Computer programmers* and *systems analysts* develop computer systems and programs to support management and scientific research. *Food scientists and technologists* work in research laboratories or on production lines to develop new products, test current ones, and control food quality.

Finally, many sales workers, including *sales representatives, wholesale and manufacturing*, are needed to sell the manufactured goods to wholesale and retail establishments. *Book-keeping, accounting, and auditing clerks* and *procurement clerks* keep track of the food products going into and out of the plant. *Janitors and cleaners* keep buildings clean and orderly.

Training and Advancement

Most workers in production-line food manufacturing jobs require little formal education or training. Graduation from high school is preferred but not always required. In general, inexperienced workers start as helpers to experienced workers and learn skills on the job. Many of these entry-level jobs can be learned in a few days. Typical jobs include operating a bread-slicing machine, washing fruits and vegetables before processing begins, hauling carcasses, or packing bottles as they come off the production line. Even though it may not take long to learn to operate a piece of equipment, employees may need several years of experience to enable them to keep the equipment running smoothly, efficiently, and safely.

Table 2. Employment of wage and salary workers in food manufacturing by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,525	100.0	4.7
Management, business, and financial occupations	73	4.8	6.2
Top executives	20	1.3	3.8
Operations specialties managers	24	1.6	5.8
Professional and related occupations	26	1.7	6.8
Service occupations	71	4.6	4.9
Fast food and counter workers	19	1.3	6.3
Janitors and cleaners, except maids and housekeeping cleaners	26	1.7	3.6
Sales and related occupations	61	4.0	1.7
Cashiers	17	1.1	-1.6
Retail salespersons	15	1.0	-3.1
Sales representatives, wholesale and manufacturing	18	1.2	6.3
Office and administrative support occupations	105	6.9	-7.3
Financial clerks	20	1.3	-9.8
Shipping, receiving, and traffic clerks	19	1.2	-5.7
Farming, fishing, and forestry occupations	23	1.5	7.7
Agricultural workers	20	1.3	7.8
Installation, maintenance, and repair occupations	84	5.5	8.0
Industrial machinery mechanics	21	1.3	12.3
Maintenance and repair workers, general	36	2.4	7.5
Production occupations	790	51.8	8.2
First-line supervisors/managers of production and operating workers	49	3.2	8.1
Assemblers and fabricators	22	1.4	-3.5
Bakers	51	3.3	6.8
Meat, poultry, and fish cutters and trimmers	121	7.9	16.3
Slaughterers and meat packers	123	8.1	18.2
Food batchmakers	57	3.8	5.0
Food cooking machine operators and tenders	26	1.7	5.9
Crushing, grinding, polishing, mixing, and blending workers	26	1.7	-5.4
Mixing and blending machine setters, operators, and tenders	20	1.3	-5.7
Inspectors, testers, sorters, samplers, and weighers	25	1.6	5.3
Packaging and filling machine operators and tenders	105	6.9	6.0
Transportation and material moving occupations	288	18.9	-1.9
Driver/sales workers	15	1.0	-6.5
Truck drivers, heavy and tractor-trailer	28	1.8	11.1
Truck drivers, light or delivery services	16	1.0	3.7
Industrial truck and tractor operators	37	2.4	0.4
Cleaners of vehicles and equipment	17	1.1	0.2
Laborers and freight, stock, and material movers, hand	56	3.7	-12.4
Packers and packagers, hand	83	5.5	-0.5

NOTE: May not add to totals due to omission of occupations with small employment.

Some food manufacturing workers need specialized training and education. Inspectors and quality control workers, for example, often are trained in food safety and may need a certificate to be employed in a food manufacturing plant. Formal educational requirements for managers in food manufacturing plants range from 2-year degrees to master's degrees. Those who hold research positions, such as food scientists, usually need a master's or doctoral degree.

In addition to specialized training, a growing number of workers receive broader training to perform a number of jobs. The need for flexibility in more automated workplaces has meant that many food manufacturing workers are learning new tasks and being trained to effectively work in teams. Some specialized training exists for bakers and some other positions.

Advancement may come in the form of higher earnings or more responsibility. Helpers usually progress to jobs as machine operators, but the speed of this progression can vary considerably. Some workers who perform exceptionally well on the production line, or those with special training and experience, may advance to supervisory positions. Plant size and the existence of formal promotion tracks may influence advancement opportunities.

Requirements for other jobs are similar to requirements for the same types of jobs in other industries. Employers usually hire high school graduates for secretarial and other clerical work. Graduates of 2-year associate degree or other postsecondary programs often are sought for science technician and related positions. College graduates or highly experienced workers are preferred for middle-management or professional jobs in personnel, accounting, marketing, or sales.

Earnings

Table 3 shows that production workers in food manufacturing averaged \$12.54 an hour, compared with \$14.95 per hour for all workers in private industry in 2002. Weekly earnings among food manufacturing workers were lower than average, \$497 compared with \$506 for all workers in private industry in 2002. Food manufacturing workers averaged about 39.6 hours a week, compared with only 33.9 for all workers in the private sector. Weekly earnings ranged from \$334 in seafood product preparation and packaging plants to \$802 in grain and oilseed milling plants. Hours worked play a large part in determining earnings. For example, grain- and oilseed-milling workers, who averaged 44.2 hours a week, had higher hourly and weekly earnings than did workers in bakeries and tortilla manufacturing companies, who averaged 36.8 hours a week. Earnings in selected occupations in food manufacturing appear in table 4.

In 2002, about 18 percent of workers in the food manufacturing industry belonged to a union or were covered by a union contract, compared with about 15 percent of all workers in the private sector. Prominent unions in the industry include the United Food and Commercial Workers; the International Brotherhood of Teamsters; and the Bakery, Confectionery, Tobacco Workers and Grain Millers International Union.

Outlook

Overall wage and salary employment in food manufacturing is expected to increase by 5 percent over the 2002-12 period,

Table 3. Average earnings of production or nonsupervisory workers in food manufacturing by industry segment, 2002

Industry segment	Weekly	Hourly
Total, private industry	\$506	\$14.95
Food manufacturing	497	12.54
Grain and oilseed milling	802	18.14
Beverages	684	17.38
Dairy products	639	15.83
Sugar and confectionery products	597	15.08
Fruit and vegetable preserving and specialty	514	12.83
Other food products	503	12.77
Bakeries and tortilla manufacturing	453	12.30
Animal slaughtering and processing	442	10.91
Seafood product preparation and packaging	334	9.70

compared with 16 percent employment growth projected for the entire economy. Despite the rising demand for manufactured food products by a growing population, automation and increasing productivity are limiting employment growth. Nevertheless, numerous job openings will arise in many segments of food manufacturing, as experienced workers transfer to other industries or retire or leave the labor force for other reasons.

Table 4. Median hourly earnings of the largest occupations in food manufacturing, 2002

Occupation	Food manufacturing	All industries
First-line supervisors/managers of production and operating workers	\$18.78	\$20.64
Industrial truck and tractor operators	12.67	12.54
Packaging and filling machine operators and tenders	11.07	10.20
Food batchmakers	10.99	10.54
Bakers	10.54	9.89
Laborers and freight, stock, and material movers, hand	10.11	9.48
Helpers—production workers	10.11	9.25
Slaughterers and meat packers	9.80	9.79
Packers and packagers, hand	9.15	8.03
Meat, poultry, and fish cutters and trimmers ..	8.47	8.57

Job growth will vary by occupation but will be concentrated among food manufacturing workers—the largest group of workers in the industry. Because many of the sorting, cutting, and chopping tasks performed by these workers have proven difficult to automate, employment among handworkers will rise along with the growing demand for food products. Handworking occupations include slaughterers and meat packers and meat, poultry, and fish cutters and trimmers, whose employment will rise as the consumption of meat, poultry, and fish climbs and more processing takes place at the manufacturing level. Other production workers also will benefit from the shift in food processing from retail establishments to manufacturing plants.

Although automation has had little effect on most handworkers, it is having a broader impact on numerous other occupations in the industry. Fierce competition has led food manufacturing plants to invest in technologically advanced machinery to be more productive. The new machines have been

applied to tasks as varied as packaging, inspection, and inventory control. As a result, employment will not increase as rapidly among some machine operators, such as packaging machine operators, as for industrial machinery mechanics who repair and maintain the new machinery. Computers also are being widely implemented throughout the industry, reducing employment growth of some mid-level managers and resulting in decreased employment for administrative support workers, but increasing the demand for workers with excellent technical skills. Taken as a whole, automation will continue to have a significant impact on workers in the industry as competition becomes even more intense in coming years.

Food manufacturing firms will be able to use this new automation to better meet the changing demands of a growing and increasingly diverse population. As convenience becomes more important, consumers increasingly demand highly processed foods such as peeled and cut carrots, microwaveable soups, or "ready-to-heat" dinners. Such a shift in consumption will contribute to the demand for food manufacturing workers and will lead to the development of thousands of new processed foods. Domestic producers also will attempt to market these goods abroad as the volume of international trade continues to grow. The increasing size and diversity of the American population

has driven demand for a greater variety of foods, including more ethnic foods. The combination of expanding export markets and shifting and increasing domestic consumption will help employment among food manufacturing workers to rise slightly over the next decade and will lead to significant changes throughout the food manufacturing industry.

Sources of Additional Information

For information on job opportunities in food manufacturing, contact individual manufacturers, locals of the unions listed in the section on earnings, and State employment service offices.

Detailed information on many occupations in food manufacturing, including the following, appears in the 2004-05 *Occupational Outlook Handbook*.

- Food-processing occupations
- Industrial production managers
- Industrial machinery installation, repair, and maintenance workers, except millwrights
- Inspectors, testers, sorters, samplers, and weighers
- Material moving occupations
- Truckdrivers and driver/sales workers

Motor Vehicle and Parts Manufacturing

(NAICS 3361, 3362, 3363)

SIGNIFICANT POINTS

- Nearly a quarter of all the industry's jobs are located in Michigan.
- Average earnings are very high compared with those in other industries.
- Employment is highly sensitive to cyclical swings in the economy.
- Employment is expected to grow in firms that manufacture motor vehicle parts, bodies, and trailers, but to decline in firms that make complete vehicles.

Nature of the Industry

The motor vehicle is an intricate series of systems, subsystems, and components assembled into a final product. Each manufactured part or component is integrated into the vehicle—none is developed to exist separately. Vehicles are constantly changing as new technology or reengineered components are incorporated, and as new and updated models are designed in response to changing consumer preferences. Motor vehicle and parts manufacturers must continually evolve to maximize efficiency and maintain continuing streams of commercially viable products in a highly competitive market.

Motor vehicles—passenger cars, sport utility vehicles, pickup trucks and vans, heavy-duty trucks, buses, and other special purpose motor vehicles ranging from limousines to garbage trucks—play a central role in our society. Most U.S. residents rely on them daily to travel to work or school, shop, or visit family and friends. Businesses depend on motor vehicles to transport people and goods. The United States is the world's largest marketplace for motor vehicles due to the size and affluence of its population. According to the U.S. Department of Transportation, more than 230 million motor vehicles—nearly 138 million automobiles, 92 million trucks, and 750,000 buses—were registered in the United States in 2001. The number of light trucks has shown especially steady growth since the mid- to late 1980s.

The vehicles we drive are only a small part of the story in motor vehicle and parts manufacturing. In 2002, about 9,600 establishments manufactured motor vehicles and parts; these ranged from small parts plants with only a few workers to huge assembly plants that employ thousands. Table 1 shows that about 7 out of 10 establishments in the industry manufactured motor vehicle parts—including electrical and electronic equipment, gasoline engines and parts, brake systems, seating and interior trim, steering and suspension components, transmission and power train parts, air-conditioners, and motor vehicle stampings, such as fenders, tops, body parts, trim, and molding. Manufacturing parts requires less assembly, and the establishments that manufacture only parts are not as vertically integrated as those that make complete vehicles. Other establishments specialized in manufacturing truck trailers, motor homes, travel trailers, campers, and car, truck, and bus bodies placed on separately purchased chassis.

The motor vehicle and parts manufacturing industry in the United States has become increasingly integrated into the inter-

Table 1. Percent distribution of establishments in motor vehicle and parts manufacturing by detailed industry sector, 2002

Industry sector	Establishments
Total	100.0
Motor vehicle parts manufacturing	70.1
Motor vehicle body and trailer manufacturing	24.9
Motor vehicle manufacturing	4.9

national economy. In fact, "domestic" vehicles often are produced using the components, manufacturing plants, and distribution methods of other nations around the world, as U.S. and foreign manufacturers of motor vehicles benefit from competitive cooperation in the design, production, and distribution of vehicles and parts. Collaboration in manufacturing practices has dramatically increased productivity and improved efficiency. These cooperative practices have also resulted in manufacturers from the United States, Europe, and the Pacific Rim locating production plants in the countries in which they plan to sell their vehicles, to reduce distribution time and costs. Foreign motor vehicle and parts makers with production sites in the United States are known as "transplants," and account for a growing share of U.S. production and employment.

Globalization of the industry has boosted competition among U.S. motor vehicle manufacturers, prompting innovations in product design and in the manufacturing process. One result of these product innovations is a proliferation of rapidly designed and produced new models aimed at niches in the market. Firms also must be fast and flexible in implementing new production techniques. Smaller production runs and mass customization result from attempts to reduce waste in the production cycle, develop more adaptive production facilities, and allow customer demand to drive changes in design and marketing. Customer-driven markets force manufacturers to replace traditional assembly lines with modern systems using computers, robots, and interchangeable workers and tools. Customized plants put resources in the right place at the right time, allowing manufacturers to change production inputs quickly and accurately.

Competition has led manufacturers to adopt innovative approaches to research and development, often in response to evolving consumer and regulatory demands. For example, demand for vehicles that can run on alternative fuels derived from batteries or solar power will put pressure on manufacturers to develop a

great deal of new technology, a challenge that likely will necessitate cooperation among both domestic and foreign manufacturers.

Motor vehicle and parts manufacturers have a major influence on other industries in the economy. They are major consumers of steel, rubber, plastics, glass, and other basic materials, thus creating jobs in industries that produce those materials. The production of motor vehicles also spurs employment growth in other industries, including automobile and other motor vehicle dealers, automotive repair and maintenance shops, gasoline stations, highway construction companies, and automotive parts, accessories, and tire stores.

Working Conditions

In 2002, about a third of workers in the motor vehicle and parts manufacturing industry worked, on average, more than 40 hours per week. Overtime is especially common during periods of peak demand. Most employees, however, typically work an 8-hour shift: either from 7:00 a.m. to 3:30 p.m. or from 4:00 p.m. to 12:30 a.m., with two breaks per shift and a half-hour for meals. A third shift often is reserved for maintenance and cleanup.

Although working conditions have improved in recent years, some production workers are still subject to uncomfortable conditions. Heat, fumes, noise, and repetition are not uncommon in this industry. In addition, many workers come into contact with oil and grease and may have to lift and fit heavy objects. Employees also may operate powerful, high-speed machines that can be dangerous. Accidents and injuries usually are avoided when protective equipment and clothing are worn and safety practices are observed.

Newer plants are more automated and have safer, more comfortable conditions. For example, these plants may have ergonomically designed work areas and job tasks that accommodate the worker's physical size and eliminate awkward reaching and bending and unnecessary heavy lifting. Workers may function as part of a team, doing more than one job and thus reducing the repetitiveness of assembly line work.

Workers in this industry experience higher rates of injury and illness than do workers in most other industries. In 2002, cases of work-related injury and illness averaged 12.1 per 100 full-time workers in motor vehicle and equipment manufacturing, compared with 7.2 in all manufacturing industries and 5.3 in the entire private sector.

As in other industries, professional and managerial workers normally have clean, comfortable offices, and are not subject to the hazards of assembly line work. Improved ergonomics help office and administrative support workers avoid repetitive strain injuries, but employees using computer terminals for long periods may develop eye strain and fatigue.

Employment

Motor vehicle and parts manufacturing was among the largest of the manufacturing industries in 2002, providing 1.2 million jobs. The majority of jobs, about 63 percent, were in firms that make motor vehicle parts. About 23 percent of workers in the industry were employed in firms assembling complete motor vehicles, while about 13 percent worked in firms producing truck trailers, motor

homes, travel trailers, campers, and car, truck, and bus bodies placed on separately purchased chassis.

Although motor vehicle and parts manufacturing jobs are scattered throughout the Nation, certain States account for the greatest numbers of jobs. Michigan, for example, accounts for nearly a quarter of all jobs. Combined, Michigan, Ohio, and Indiana include nearly half of all the jobs in this industry. Other States that account for significant numbers of jobs include California, Tennessee, Texas, Kentucky, and Missouri.

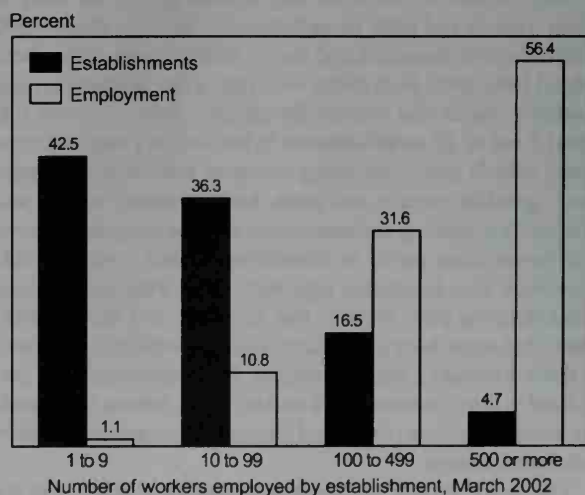
Employment is concentrated in a relatively small number of very large establishments. More than half of motor vehicle and parts manufacturing jobs were in establishments employing 500 or more workers (chart). Motor vehicle manufacturing employment in particular is concentrated in large establishments, whereas many motor vehicle parts manufacturing jobs are found in small and medium-sized establishments.

Occupations in the Industry

Prior to assembling components in the manufacturing plant, extensive design, engineering, testing, and production planning go into the manufacture of motor vehicles. These tasks often require years to complete and cost millions of dollars.

Using artistic talent, computers, and information on product use, marketing, materials, and production methods, *commercial and industrial designers* create designs they hope will make the vehicle competitive in the marketplace. Designers use sketches and computer-aided design techniques to create computer models of proposed vehicles. These computer models eliminate the need for physical body mockups in the design process because they give designers complete information on how each piece of the vehicle will work with others. Workers may repeatedly modify and redesign models until the models meet engineering, production, and marketing specifications. Designers working in parts production increasingly collaborate with manufacturers in the initial de-

The majority of jobs in motor vehicle and parts manufacturing are in establishments employing 500 or more workers



sign stages to integrate motor vehicle parts into the design specifications for each vehicle.

Engineers—the largest professional occupation in the industry—play an integral role in all stages of motor vehicle manufacturing. They oversee the building and testing of the engine, transmission, brakes, suspension, and other mechanical and electrical components. Using computers and assorted models, instruments, and tools, engineers simulate various parts of the vehicle to determine whether each part meets cost, safety, performance, and quality specifications. *Mechanical engineers* design improvements for engines, transmissions, and other working parts. *Electrical and electronics engineers* design the vehicle's electrical and electronic systems, as well as industrial robot control systems used to assemble the vehicle. *Industrial engineers* concentrate on plant layout, including the arrangement of assembly line stations, material-moving equipment, work standards, and other production matters.

Under the direction of engineers, *engineering technicians* prepare specifications for materials, devise and run tests to ensure product quality, and study ways to improve manufacturing efficiency. For example, testing may reveal how metal parts perform under conditions of heat, cold, and stress, and whether emissions control equipment meets environmental standards. Finally, prototype vehicles incorporating all the components are built and tested on test tracks, on road simulators, and in test chambers that can duplicate almost every driving condition, including crashes.

Computer programmers write detailed instructions for computers, and *computer systems analysts* work with computer systems to improve manufacturing efficiency. After working out the many details involved, computer specialists help put in place the machinery and tools required for assembly line production of the vehicle.

Management workers establish guidelines for the design of motor vehicles to provide direction for the teams of experts in engineering, design, marketing, sales, finance, and production. From the earliest stages of planning and design, these specialists help assess whether the vehicle will satisfy consumer demand, meet safety and environmental regulations, and prove economically practical to make. These executives also serve as public representatives for the company—they are the face of the company.

Industrial production managers oversee first-line supervisors and managers of production and operating workers. These supervisors oversee inspectors, precision workers, machine setters and operators, assemblers, fabricators, and plant and system operators. They coordinate a variety of manufacturing processes and production activities, including scheduling, staffing, equipment, quality control, and inventory control.

Production workers account for about 64 percent of motor vehicle and parts manufacturing jobs (table 2). *Assemblers and fabricators* and *metal workers and plastic workers* put together various parts to form subassemblies, and then put the subassemblies together to build a complete motor vehicle. Some may perform other routine tasks such as mounting and inflating tires; adjusting brakes; and adding gas, oil, brake fluid, and coolant. Metal parts are welded, plastic and glass parts are molded and cut, seat cushions are sewn, and many parts are painted. Many

manufacturing processes are highly automated; robots, computers, and programmable devices are an integral part of motor vehicle manufacturing. Throughout the manufacturing process, "statistical process control" (teamwork and quality control) is emphasized. From initial planning and design to final assembly, numerous tests and inspections ensure that vehicles meet quality and safety standards. Modern manufacturing facilities integrate interchangeable tools on the assembly line so that they can quickly be changed to meet the needs of various models and specifications.

Although robots perform most of the welding, *welding, soldering, and brazing workers* still are needed for some welding and for maintenance and repair duties. *Machinists* produce precision metal parts that are made in numbers too small to produce with automated machinery. *Tool and die makers* produce tools, dies, and special guiding and holding devices used in machines. *Computer-controlled machine tool operators* use computer-controlled machines or robots programmed to manufacture parts of different dimensions automatically.

Workers in other production occupations run various machines that produce an array of motor vehicle bodies and parts. These workers set up and operate machines and make adjustments according to their instructions. In computer-controlled systems, they monitor computers controlling the machine processes and may have little interaction with the machinery or materials. Some workers specialize in one type of machine; others operate more than one type.

Grinding and polishing workers use hand tools or hand-held power tools to sand and polish metal surfaces, and *painting workers* paint surfaces of motor vehicles. *Sewing machine operators* sew together pieces of material to form seat covers and other parts.

Throughout the manufacturing process, *inspectors, testers, sorters, samplers, and weighers* ensure that motor vehicles and parts meet quality standards. They inspect raw materials, check parts for defects, check the uniformity of subassemblies, and test drive vehicles. *Helpers* supply or hold materials or tools, and clean work areas and equipment.

Motor vehicle operators and material-moving workers are essential to keeping the plant running smoothly. *Industrial truck and tractor operators* carry components, equipment, and other materials from factory warehouse and outdoor storage areas to assembly areas. *Truckdrivers* carry raw materials to plants, components and materials between plants, and finished motor vehicles to dealerships for sale to consumers. *Laborers and hand freight, stock, and material movers* manually move materials to and from storage areas, loading docks, delivery vehicles, and containers. *Machine feeders* and *offbearers* feed materials into, or remove materials from, machines or equipment on the assembly line, and *hand packers and packagers* manually package or wrap materials.

Workers in construction, installation, maintenance, and repair occupations set up, maintain, and repair equipment. *Electricians* service complex electrical equipment. *Industrial machinery mechanics* and *machinery maintenance workers* maintain machinery and equipment to prevent costly breakdowns and, when necessary, perform repairs. *Millwrights* install and move machinery and heavy equipment according to the factory's lay-

Table 2. Employment of wage and salary workers in motor vehicle and parts manufacturing by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,152	100.0	2.6
Management, business, and financial occupations	76	6.6	14.7
Top executives	10	0.8	13.4
Industrial production managers	10	0.8	13.5
Professional and related occupations	91	7.9	14.0
Electrical and electronics engineers	2	0.2	10.5
Industrial engineers	17	1.5	23.2
Mechanical engineers	19	0.9	5.2
Drafters, engineering, and mapping technicians	21	1.9	13.0
Commercial and industrial designers	2	0.2	11.0
Office and administrative support occupations	61	5.3	-0.7
Construction and extraction occupations	31	2.7	18.6
Electricians	17	1.5	22.6
Installation, maintenance, and repair occupations	70	6.1	10.0
Automotive service technicians and mechanics	7	0.6	10.3
Industrial machinery mechanics	9	0.8	13.6
Millwrights	9	0.8	-3.8
Production occupations	735	63.9	-1.4
First-line supervisors/managers of production and operating workers	35	3.0	14.6
Electrical and electronic equipment assemblers	12	1.0	-10.6
Engine and other machine assemblers	14	1.2	-6.0
Team assemblers	181	15.7	-8.8
All other assemblers and fabricators	86	7.5	-15.8
Computer-controlled machine tool operators, metal and plastic	13	1.1	6.9
Forming machine setters, operators, and tenders, metal and plastic	15	1.3	-3.4
Machine tool cutting setters, operators, and tenders, metal and plastic	64	5.6	4.1
Machinists	18	1.6	4.4
Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	13	1.1	3.8
Multiple machine tool setters, operators, and tenders, metal and plastic	23	2.0	4.5
Tool and die makers	22	1.9	-5.4
Welding, soldering, and brazing workers	54	4.7	13.4
Miscellaneous metalworkers and plastic workers	26	2.3	1.5
Inspectors, testers, sorters, samplers, and weighers	36	3.1	-0.7
Painting workers	15	1.3	12.0
Miscellaneous production workers	61	5.3	-0.1
Transportation and material moving occupations	67	5.8	1.2
Industrial truck and tractor operators	21	1.9	0.4
Laborers and freight, stock, and material movers, hand	23	2.0	-6.3

Note: May not add to totals due to omission of occupations with small employment.

out plans. *Automotive service technicians and mechanics* fix bodies, engines, and other parts of motor vehicles, industrial trucks, and other mobile heavy equipment.

Training and Advancement

Faced with technological advances and the continued need to cut costs, manufacturers increasingly emphasize continuing education and cross-train many workers—that is, they train workers to do more than one job. This has led to a change in the profile of the industry's workers. Standards for new hires are much higher now than in the past. Employers increasingly require at least a high school diploma as the number of unskilled jobs declines. Manual dexterity will continue to be necessary for many production jobs, but employers also look for employees with good communication and math skills, as well as an aptitude for computers, problem-solving, and critical thinking. Because many plants now emphasize the team approach, employees interact more with co-workers and supervisors to determine the best way to get the job done. They are expected to work with much less supervision than in the past and to be responsible for ensuring that their work conforms to guidelines.

Opportunities for training and advancement vary considerably by occupation, plant size, and sector. Training programs in larger auto and light truck assembly plants usually are more extensive than those in smaller parts, truck trailer, and motor home factories. Production workers receive most of their training on the job or through more formal apprenticeship programs. Training normally takes from a few days to several months and may combine classroom with on-the-job training under the guidance of more experienced workers. Attaining the highest level of skill in some production jobs requires several years, however. Training often includes courses in health and safety, teamwork, and quality control. With advanced training and experience, production workers can advance to inspector or more skilled production, craft, operator, or repair jobs.

Skilled production workers—such as tool and die makers, millwrights, machinists, pipefitters, and electricians—normally are hired on the basis of previous experience and, in some cases, a competitive examination. Alternatively, the company may train inexperienced workers in apprenticeship programs that last up to 5 years, and combine on-the-job training with classroom instruction. Typical courses include mechanical drawing, tool designing and programming, blueprint reading, shop mathematics, hydraulics, and electronics. Training also includes courses on health and safety, teamwork, quality control, computers, and diagnostic equipment. With training and experience, workers who excel can advance to become supervisors or managers.

Motor vehicle manufacturers provide formal training opportunities to all workers, regardless of educational background. Manufacturers offer some classes themselves and pay tuition for workers who enroll in colleges, trade schools, or technical institutes. Workers sometimes can get college credit for training received on the job. Subjects of company training courses range from communication skills to computer science. Formal educational opportunities at postsecondary institutions range from courses in English, basic mathematics, electronics, and computer programming languages to work-study programs leading to as-

sociate, bachelor's, and graduate degrees in engineering and technician specialties, management, and other fields.

Earnings

Average weekly earnings of production or nonsupervisory workers in the motor vehicle and parts manufacturing industry are relatively high. At \$1,184 per week, earnings of production workers in establishments that manufacture complete motor vehicles were among the highest in the Nation in 2002. Workers in establishments that make motor vehicle parts averaged \$848 weekly, and those in motor vehicle body and trailer manufacturing earned \$625 per week, compared with \$619 for workers in all manufacturing industries, and \$506 for those in the entire private sector. Earnings in selected occupations in motor vehicle and parts manufacturing appear in table 3.

Table 3. Median hourly earnings of the largest occupations in motor vehicle and parts manufacturing, 2002

Occupation	Motor vehicles and parts	All industries
Industrial engineers	\$30.10	\$29.88
Tool and die makers	25.64	20.54
Maintenance and repair workers, general	19.00	14.12
Inspectors, testers, sorters, samplers, and weighers	16.49	13.01
Welders, cutters, solderers, and brazers	16.02	14.02
Computer-controlled machine tool operators, metal and plastic	13.08	13.97
Laborers and freight, stock, and material movers, hand	13.03	9.48
Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	13.01	11.17
Engine and other machine assemblers	12.45	14.02
Team assemblers	12.36	10.90

These hourly earnings may increase during overtime or special shifts. Workers generally are paid 1-1/2 times their normal wage rate for working more than 8 hours a day or 40 hours a week, or for working on Saturdays. They may receive double their normal wage rate for working on Sundays and holidays. The largest manufacturers and suppliers often offer other benefits, including paid vacations and holidays; life, accident, and health insurance; education allowances; nonwage cash payment plans, such as performance and profit-sharing bonuses; and pension plans. Some laid-off workers in the motor vehicle and parts manufacturing industry have access to supplemental unemployment benefits, which can provide them with nearly full pay and benefits for up to 3 years, depending on the worker's seniority.

In 2002, about a third of workers in motor vehicle and parts production were union members or were covered by union contracts, more than double the proportion of workers in all industries. A greater proportion of workers in motor vehicle production were members of unions than in parts production. The primary union in the industry is the United Automobile, Aerospace, and Agricultural Implement Workers of America, also known as the United Auto Workers (UAW). Nearly all produc-

tion workers in motor vehicle assembly plants, and most in motor vehicle parts plants, are covered by collective bargaining agreements negotiated by the UAW. Other unions—including the International Association of Machinists and Aerospace Workers, the United Steelworkers of America, and the International Brotherhood of Electrical Workers—cover certain plant locations or specified trades in the industry.

Outlook

Overall wage and salary employment in the motor vehicle and parts manufacturing industry is expected to increase 3 percent over the 2002-12 period, compared with 16 percent for all industries combined. Job loss in motor vehicle manufacturing will be more than offset by gains in firms manufacturing motor vehicle parts, bodies, and trailers. Employment is expected to decline by 6 percent in motor vehicle manufacturing, but increase by 4 percent in motor vehicle parts manufacturing and 12 percent in motor vehicle body and trailer manufacturing.

In addition to job openings due to growth in firms manufacturing motor vehicle parts, bodies, and trailers, the need to replace workers who retire or transfer to jobs in other industries will also generate job openings. Not all of the motor vehicle manufacturing workers who leave jobs in the industry will be replaced, and many of the new workers will be hired for occupations different from those vacated by departing employees.

Employment in the motor vehicle and parts manufacturing industry is expected to grow with demand for motor vehicles and parts, but jobs will be lost due to downsizing and productivity increases. The growing intensity of international and domestic competition has increased cost pressures on manufacturers. In response, they have sought to improve productivity and quality through the application of high-technology production techniques, including robots, computers, and programmable equipment. Increasing productivity should mostly offset the increasing output of the motor vehicle and parts manufacturing industry, resulting in slow job growth. In addition, the industry is increasingly turning to contract employees in an effort to reduce costs. Contract workers are less costly to hire and lay off than permanent employees; contract jobs also serve as a screening tool for candidates for permanent jobs that are more complex and require more skills.

Growth in demand for domestically manufactured motor vehicles could be limited by a number of factors. A slowdown in the growth of the driving-age population, as the smaller post baby-boom generation comes of age may curb demand for cars and trucks. Also, foreign motor vehicle and parts producers will continue to control a substantial share of the U.S. market and, should they increasingly meet demand with imported vehicles and parts instead of products manufactured in U.S. transplant factories, domestic motor vehicle and parts output would be lower. Other factors that may limit growth of domestic motor vehicle production include improvements in vehicle quality and durability, which extend longevity, and more stringent safety and environmental regulations, which increase the cost of producing and operating motor vehicles.

Employment in motor vehicle and parts manufacturing is highly sensitive to cyclical swings in the economy. During periods of

economic prosperity, consumers are more willing and able to purchase expensive goods such as motor vehicles, which may require large down payments and extended loan payments. During recessions, however, consumers are more likely to delay such purchases. Motor vehicle manufacturers respond to these changes in demand by hiring or laying off workers.

Expanding factory automation, robotics, efficiency gains, and the need to cut costs are expected to keep employment from growing as fast as output. The movement towards efficiency and automation will force employment declines in assembler and fabricator occupations. Employment of office and administrative support workers will decline due to expanding office and warehouse automation. Automation and continued global competition, however, are expected to produce job growth for engineers, industrial production managers, business operations specialists, and computer specialists. These workers will increasingly be relied upon for further innovation in reducing costs and enhancing competitive advantage.

Sources of Additional Information

Information on employment and training opportunities in the motor vehicle and parts manufacturing industry is available from local offices of the State employment service, employment of-

fices of motor vehicle and parts manufacturing firms, and locals of the unions mentioned above.

Detailed information on most occupations in this industry, including the following, appears in the 2004-05 edition of the *Occupational Outlook Handbook*:

- Designers
- Drafters
- Electricians
- Engineering technicians
- Engineers
- Industrial production managers
- Inspectors, testers, sorters, samplers, and weighers
- Machine setters, operators, and tenders—metal and plastic
- Machinists
- Material moving occupations
- Material recording, scheduling, dispatching, and distributing occupations
- Painting and coating workers, except construction and maintenance
- Tool and die makers
- Welding, soldering, and brazing workers

Pharmaceutical and Medicine Manufacturing

(NAICS 3254)

SIGNIFICANT POINTS

- More than 6 out of 10 workers have a bachelor's, master's, professional, or Ph.D. degree—more than twice the proportion for all industries combined.
- Nearly 47 percent of all jobs are in large establishments employing more than 1,000 workers.
- Earnings are much higher than those in other manufacturing industries.
- This industry ranks among the fastest growing manufacturing industries.

Nature of the Industry

The pharmaceutical and medicine manufacturing industry has produced a variety of medicinal and other health-related products undreamed of by even the most imaginative apothecaries of the past. These drugs save the lives of millions of people from various diseases and permit many ill people to lead normal lives.

Thousands of medications are available today for diagnostic, preventive, and therapeutic uses. In addition to aiding in the treatment of infectious diseases such as pneumonia, tuberculosis, malaria, influenza, and sexually transmitted diseases, these medicines also help prevent and treat cardiovascular disease, asthma, diabetes, and cancer. For example, antinausea drugs help cancer patients endure chemotherapy; clot-buster drugs help stroke patients avoid brain damage; and psychoactive drugs reduce the severity of mental illness for many people. Antibiotics and vaccines have virtually wiped out such diseases as diphtheria, syphilis, and whooping cough. Discoveries in veterinary drugs have controlled various diseases, some of which are transmissible to humans.

At each stage of life—from early infancy through old age—innovative drug discoveries help millions of patients lead longer, healthier, happier, and more productive lives. These longer life spans are due, in large part, to the conquest of diseases through drug research and drug manufacturing. But modern drugs do even more than save lives and improve the well-being of patients. As they improve health, they also save money by keeping people out of hospitals, emergency rooms, and nursing homes, thus reducing healthcare costs.

Advances in biotechnology and information technology are transforming drug discovery and development. Within biotechnology, scientists have learned a great deal about human genes, but the real work—translating that knowledge into viable new drugs—is just beginning. Many new drugs are expected to be developed in the coming years. Where it once took 15 years to develop a new drug, advances in technology and the knowledge of how cells work have allowed pharmaceutical and medicine manufacturing makers to shave years off that incubation period. New technology allows life scientists to test thousands of drug candidates in 1 day.

There is a direct relationship between gene discovery and identification of new drugs: the more genes identified, the more paths available for drug discovery. Discovery of new genes also

can lead to new diagnostics for the early detection of disease. Among other uses, new genetic technology is being explored to develop vaccines to prevent or treat diseases that have eluded traditional vaccines, such as AIDS, malaria, tuberculosis, and cervical cancer.

The pharmaceutical and medicine manufacturing industry consists of about 2,500 places of employment, located throughout the country. These include establishments that make pharmaceutical preparations or finished drugs; biological products, such as serums and vaccines; bulk chemicals and botanicals used in making finished drugs; and diagnostic substances such as pregnancy and blood glucose kits.

The U.S. pharmaceutical industry has achieved worldwide prominence through research and development (R&D) work on new drugs, and spends a relatively high proportion of its funds on R&D compared with other industries. Each year, pharmaceutical industry testing involves many thousands of new substances, yet may eventually yield only 10 to 20 new prescription medicines.

For the majority of firms in this industry, the actual manufacture of drugs is the last stage in a lengthy process that begins with scientific research to discover new products and to improve or modify existing ones. The R&D departments in pharmaceutical and medicine manufacturing firms start this process by seeking new chemical compounds with the potential to prevent, combat, or alleviate symptoms of diseases or other health problems. Scientists use sophisticated tools, such as computer simulation and combinatorial chemistry, to hasten and simplify the discovery of potentially useful new compounds.

Most firms devote a substantial portion of their R&D budgets to applied research, using scientific knowledge to develop a drug targeted to a specific use. For example, an R&D unit may focus on developing a compound that will effectively slow the advance of breast cancer. If the discovery phase yields promising compounds, technical teams then attempt to develop a safe and effective product based on the discoveries.

To test new products in development, a research method called “screening” is used. To screen an antibiotic, for example, a sample is first placed in a bacterial culture. If the antibiotic is effective, it is next tested on infected laboratory animals. Laboratory animals also are used to study the safety and efficacy of the new drug. A new drug is selected for testing on humans only if it promises to have therapeutic advantages over drugs already in use, or is

safer. Drug screening is an incredibly risky, laborious, and high-cost process—only 1 in every 5,000 to 10,000 compounds screened eventually becomes an approved drug.

After laboratory screening, firms conduct clinical investigations, or “trials,” of the drug on human patients. Human clinical trials normally take place in three phases. First, medical scientists administer the drug to a small group of healthy volunteers to determine and adjust dosage levels, and monitor for side effects. If a drug appears useful and safe, additional tests are conducted in two more phases, each phase using a successively larger group of volunteers or carefully selected patients.

After a drug successfully passes animal and clinical tests, the U.S. Food and Drug Administration (FDA) must review the drug’s performance on human patients before approving the substance for commercial use. The entire process, from the first discovery of a promising new compound to FDA approval, can take many years. However, scientific and information technology advances will shorten that process considerably for most drugs.

After FDA approval, problems of production methods and costs must be worked out before manufacturing begins. If the original laboratory process of preparing and compounding the ingredients is complex and too expensive, pharmacists, chemists, chemical engineers, packaging engineers, and production specialists are assigned to develop a manufacturing process economically adaptable to mass production. After the drug is marketed, new production methods may be developed to incorporate new technology or to transfer the manufacturing operation to a new production site.

In many production operations, pharmaceutical manufacturers have developed a high degree of automation. Milling and micronizing machines, which pulverize substances into extremely fine particles, are used to reduce bulk chemicals to the required size. These finished chemicals are combined and processed further in mixing machines. The mixed ingredients may then be mechanically capsulated, pressed into tablets, or made into solutions. One type of machine, for example, automatically fills, seals, and stamps capsules. Other machines fill bottles with capsules, tablets, or liquids, and seal, label, and package the bottles.

Quality control and quality assurance are vital in this industry. Many production workers are assigned full time to quality control and quality assurance functions, whereas other employees may devote part of their time to these functions. For example, although pharmaceutical company sales representatives, often called detailers, work primarily in marketing, they engage in quality control when they assist pharmacists in checking for outdated products.

Working Conditions

Working conditions in pharmaceutical plants are better than those in most other manufacturing plants. Much emphasis is placed on keeping equipment and work areas clean because of the danger of contamination. Plants usually are air-conditioned, well lighted, and quiet. Ventilation systems protect workers from dust, fumes, and disagreeable odors. Special precautions are taken to protect the relatively small number of employees who work with infectious cultures and poisonous chemicals. With the exception of work performed by material handlers and

maintenance workers, most jobs require little physical effort. In 2002, the incidence of work-related injury and illness was 3.0 cases per 100 full-time workers, compared with 7.2 per 100 for all manufacturing industries and 5.3 per 100 for the entire private sector.

Only about 5 percent of the workers in the pharmaceutical and medicine manufacturing industry are union members or are covered by a union contract, compared with about 15 percent of workers throughout private industry.

Employment

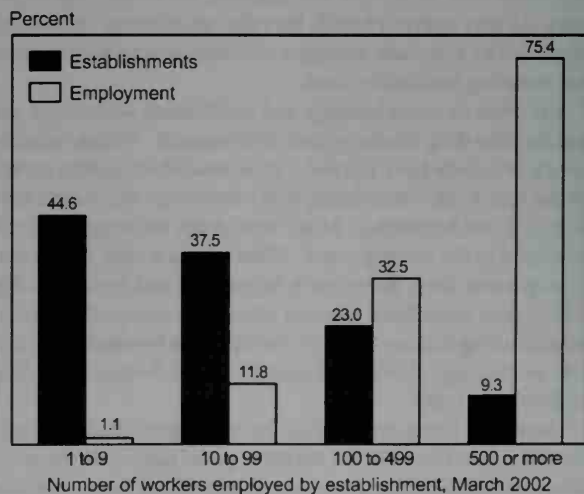
Pharmaceutical and medicine manufacturing provided 293,000 wage and salary jobs in 2002. Pharmaceutical and medicine manufacturing establishments typically employ many workers. About 75 percent of this industry’s jobs in 2002 were in establishments that employed 500 or more workers (see chart). Most jobs are in California, Illinois, Indiana, New Jersey, New York, North Carolina, and Pennsylvania.

Under the new North American Industry Classification System (NAICS), workers in research and development (R&D) establishments that are not part of a manufacturing facility are included in a separate industry—research and development in the physical, engineering, and life sciences. However, due to the importance of R&D work to the pharmaceutical and medicine manufacturing industry, drug-related R&D is discussed in this statement even though a large proportion of pharmaceutical industry-related R&D workers are not included in the employment data.

Occupations in the Industry

About 28 percent of all jobs in the pharmaceutical and medicine manufacturing industry are in professional and related occupations, mostly scientists and science technicians, about 18 percent are in management occupations, another 12 percent in office and administrative support, and 3 percent in sales and related

**In pharmaceutical and medicine manufacturing
3 out of 4 jobs are in establishments with
500 or more workers**



occupations. About 3 out of 10 jobs in the industry are in production occupations, including both low-skilled and high-skilled jobs (table 1).

Scientists, engineers, and technicians conduct research to develop new drugs. Others work to streamline production methods and improve environmental and quality control. Life scientists are among the largest scientific occupations in this industry. Most of these scientists are *biological* and *medical scientists* who produce new drugs using biotechnology to recombine the genetic material of animals or plants. Biological scientists normally specialize in a particular area. *Biologists* and *bacteriologists* study the effect of chemical agents on infected animals. *Biochemists* study the action of drugs on body processes by analyzing the chemical combination and reactions involved in metabolism, reproduction, and heredity. *Microbiologists* grow strains of microorganisms that produce antibiotics. *Physiologists* investigate the effect of drugs on body functions and vital processes. *Pharmacologists* and *zoologists* study the effects of drugs on animals. *Virologists* grow viruses, and develop vaccines and test them in animals. *Botanists*, with their special knowledge of plant life, contribute to the discovery of botanical ingredients for drugs. Other biological scientists include *pathologists*, who study normal and abnormal cells or tissues, and *toxicologists*, who are concerned with safety, dosage levels, and the compatibility of different drugs. *Medical scientists*, who also may be physicians, conduct clinical research, test products, and oversee human clinical trials.

Physical scientists, particularly *chemists*, also are important in the research and development of new drugs. *Organic chemists* combine new compounds for biological testing. *Physical chemists* separate and identify substances, determine molecular structure, help create new compounds, and improve manufacturing processes. *Radiochemists* trace the course of drugs through body organs and tissues. *Pharmaceutical chemists* set standards and specifications for the form of products and for storage conditions; they also see that drug labeling and literature meet the requirements of State and Federal laws. *Analytical chemists* test raw and intermediate materials and finished products for quality.

Science technicians, such as *biological* and *chemical technicians*, play an important part in research on and development of new medicines. They set up, operate, and maintain laboratory equipment, monitor experiments, analyze data, and record and interpret results. Science technicians usually work under the supervision of scientists or engineers.

Although engineers account for a small fraction of scientific and technical workers, they make significant contributions toward improving quality control and production efficiency. *Chemical engineers* design equipment and devise manufacturing processes. *Bioprocess engineers*, who are similar to chemical engineers, design fermentation vats and various bioreactors for microorganisms that will produce a given product. *Industrial engineers* plan equipment layout and workflow to maintain efficient use of plant facilities.

At the top of the managerial group are executives who make policy decisions concerning matters of finance, marketing, and research. Other managerial workers include *natural sciences managers* and *industrial production managers*.

Table 1. Employment of wage and salary workers in pharmaceutical and medicine manufacturing by occupation, 2002 and projected change, 2002-12.
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	293	100.0	23.2
Management, business, and financial occupations	52	17.8	27.1
Top executives	6	1.9	22.6
Advertising, marketing, promotions, public relations, and sales managers	4	1.5	29.2
Industrial production managers	4	1.5	25.4
Natural sciences managers	5	1.6	25.4
Business operations specialists	14	4.7	30.8
Financial specialists	4	1.4	24.9
Professional and related occupations	81	27.5	31.3
Computer specialists	9	3.1	35.0
Engineering technicians, except drafters	3	1.0	26.1
Biological scientists	7	2.3	37.8
Medical scientists	9	3.0	35.7
Chemists and materials scientists	15	5.0	37.5
Biological technicians	6	2.2	30.8
Chemical technicians	7	2.3	25.0
Service occupations	5	1.8	19.9
Building and grounds cleaning and maintenance occupations	3	1.0	19.0
Sales and related occupations	8	2.8	25.1
Sales representatives, wholesale and manufacturing	7	2.2	25.4
Office and administrative support occupations	36	12.4	7.8
Financial clerks	4	1.3	6.5
Information and record clerks	6	2.0	15.1
Shipping, receiving, and traffic clerks	4	1.2	10.5
Secretaries and administrative assistants	10	3.5	3.3
Installation, maintenance, and repair occupations	13	4.5	27.0
Industrial machinery mechanics	4	1.2	30.7
Maintenance and repair workers, general	6	2.0	25.4
Production occupations	85	29.0	20.2
First-line supervisors/managers of production and operating workers	9	3.1	25.4
Assemblers and fabricators	6	2.1	14.2
Chemical plant and system operators	3	1.2	25.4
Chemical equipment operators and tenders	9	3.1	25.4
Separating, filtering, clarifying, precipitating, and still machine setters, operators, and tenders	5	1.6	25.4
Mixing and blending machine setters, operators, and tenders	8	2.6	12.8
Inspectors, testers, sorters, samplers, and weighers	9	2.9	11.6
Packaging and filling machine operators and tenders	20	6.9	25.4
Transportation and material moving occupations	11	3.6	14.1
Material moving occupations	9	3.2	13.0
Laborers and material movers, hand	8	2.7	11.4
Laborers and freight, stock, and material movers, hand	4	1.3	3.0
Packers and packagers, hand	3	1.0	22.0

NOTE: May not add to totals due to omission of occupations with small employment.

Office and administrative support employees include *secretaries and administrative assistants, general office clerks*, and others who keep records on personnel, payroll, raw materials, sales, and shipments.

Sales representatives, wholesale and manufacturing, describe their company's products to physicians, pharmacists, dentists, and health services administrators. These sales representatives serve as lines of communication between their companies and clients.

Most plant workers fall into 1 of 2 occupational groups: Production workers who operate drug-producing equipment, inspect products, and install, maintain, and repair production equipment; and transportation and material-moving workers who package and transport the drugs.

Workers among the larger of the production occupations, *assemblers and fabricators*, perform all of the assembly tasks assigned to their teams, rotating through the different tasks rather than specializing in a single task. They also may decide how the work is to be assigned and how different tasks are to be performed.

Other production workers specialize in one part of the production process. *Chemical processing machine setters, operators, and tenders*, such as *pharmaceutical operators*, control machines that produce tablets, capsules, ointments, and medical solutions. Included are *mixing and blending machine setters, operators, and tenders*, who tend milling and grinding machines that reduce mixtures to particles of designated sizes. *Extruding, forming, pressing, and compacting machine setters, operators, and tenders* tend tanks and kettles in which solutions are mixed and compounded to make up creams, ointments, liquid medications, and powders. *Crushing, grinding, polishing, mixing, and blending workers* operate machines that compress ingredients into tablets. *Coating, painting, and spraying machine setters, operators, and tenders*, often called capsule coaters, control a battery of machines that apply coatings that flavor, color, preserve, or add medication to tablets, or control disintegration time. Throughout the production process, *inspectors, testers, sorters, samplers, and weighers* ensure consistency and quality. For example, *ampoule examiners* inspect ampoules for discoloration, foreign particles, and flaws in the glass. *Tablet testers* inspect tablets for hardness, chipping, and weight to assure conformity with specifications.

After the drug is prepared and inspected, it is bottled or otherwise packaged by *packaging and filling machine operators and tenders*. Semiskilled workers do most of the packaging and bottle-filling with machines that measure exact amounts of the product and seal containers.

Plant workers who do not operate or maintain equipment perform a variety of other tasks. Some drive industrial trucks or tractors to move materials around the plant, load and unload trucks and railroad cars, or package products and materials by hand.

Training and Advancement

Training requirements for jobs in the pharmaceutical and medicine manufacturing industry range from a few hours of on-the-job training to years of formal education plus job experience. More than 6 out of 10 of all workers have a bachelor's, master's,

professional, or Ph.D. degree—more than twice the proportion for all industries combined. The industry places a heavy emphasis on continuing education for employees, and many firms provide classroom training in safety, environmental and quality control, and technological advances.

For production occupations, manufacturers usually hire inexperienced workers and train them on the job; high school graduates generally are preferred. Beginners in production jobs assist experienced workers and learn to operate processing equipment. With experience, employees may advance to more skilled jobs in their departments.

Many companies encourage production workers to take courses related to their jobs at local schools and technical institutes or to enroll in correspondence courses. College courses in chemistry and related areas are particularly encouraged for highly skilled production workers who operate sophisticated equipment. Some companies reimburse workers for part, or all, of their tuition. Skilled production workers with leadership ability may advance to supervisory positions.

For science technician jobs in this industry, most companies prefer to hire graduates of technical institutes or junior colleges or those who have completed college courses in chemistry, biology, mathematics, or engineering. Some companies, however, require science technicians to hold a bachelor's degree in a biological or chemical science. In many firms, newly hired workers begin as laboratory helpers or aides, performing routine jobs such as cleaning and arranging bottles, test tubes, and other equipment.

The experience required for higher level technician jobs varies from company to company. Usually, employees advance over a number of years from assistant technician, to technician, to senior technician, and then to technical associate, or supervisory technician.

For most scientific and engineering jobs, a bachelor of science degree is the minimum requirement. Scientists involved in research and development usually have a master's or doctoral degree. A doctoral degree is generally the minimum requirement for medical scientists, and those who administer drug or gene therapy to patients in clinical trials must have a medical degree. Because biotechnology is not one discipline, but the interaction of several disciplines, the best preparation for work in biotechnology is training in a traditional biological science, such as genetics, molecular biology, biochemistry, virology, or biochemical engineering. Individuals with a scientific background and several years of industrial experience may eventually advance to managerial positions. Some companies offer training programs to help scientists and engineers keep abreast of new developments in their fields and to develop administrative skills. These programs may include meetings and seminars with consultants from various fields. Many companies encourage scientists and engineers to further their education; some companies provide financial assistance or full reimbursement of expenses for this purpose. Publication of scientific papers also is encouraged.

Pharmaceutical manufacturing companies prefer to hire college graduates, particularly those with strong scientific backgrounds. In addition to a 4-year degree, most newly employed pharmaceutical sales representatives complete rigorous formal training programs revolving around their company's product lines.

Earnings

Earnings of workers in the pharmaceutical and medicine manufacturing industry are higher than the average for all manufacturing industries. In 2002, production or nonsupervisory workers in this industry averaged \$777 a week, while those in all manufacturing industries averaged \$619 a week. Earnings in selected occupations in pharmaceutical and medicine manufacturing appear in table 2.

Some employees work in plants that operate around the clock—three shifts a day, 7 days a week. In most plants, workers receive extra pay when assigned to the second or third shift. Because drug production is subject to little seasonal variation, work is steady.

Table 2. Median hourly earnings of the largest occupations in pharmaceutical and medicine manufacturing, 2002.

Occupation	Pharmaceutical and medicine manufacturing	All industries
Medical scientists, except epidemiologists	\$34.77	\$27.40
Chemists	25.51	25.43
First-line supervisors/managers of production and operating workers	25.05	20.64
Chemical technicians	18.49	18.00
Chemical equipment operators and tenders ...	18.15	18.00
Biological technicians	17.83	15.73
Inspectors, testers, sorters, samplers, and weighers	14.27	13.01
Mixing and blending machine setters, operators, and tenders	13.76	13.23
Packaging and filling machine operators and tenders	12.77	10.20
Team assemblers	10.81	10.90

Outlook

The number of wage and salary jobs in pharmaceutical and medicine manufacturing is expected to increase by about 23 percent over the 2002-12 period, compared with 16 percent for all industries combined. Pharmaceutical and medicine manufacturing ranks among the fastest growing manufacturing industries. Demand for this industry's products is expected to remain strong. Even during fluctuating economic conditions, there will be a market for over-the-counter and prescription drugs, including the diagnostics used in hospitals, laboratories, and homes; the vaccines used routinely on infants and children; analgesics and other symptom-easing drugs; and antibiotics and "miracle" drugs for life-threatening diseases.

Although the use of drugs, particularly antibiotics and vaccines, has helped to eradicate or limit a number of deadly diseases, many others, such as cancer, Alzheimer's, and heart disease, continue to elude cures. Ongoing research and the manufacture of new products to combat these diseases will continue to contribute to employment growth.

Because so many of the pharmaceutical and medicine manufacturing industry's products are related to preventive or routine healthcare, rather than just illness, demand is expected to increase as the population expands. The growing number of older people who will require more healthcare services will further stimu-

late demand—along with the growth of both public and private health insurance programs, which increasingly cover the cost of drugs and medicines.

Another factor propelling demand is the increasing popularity of lifestyle drugs that treat symptoms of chronic non-life-threatening conditions resulting from aging, and can enhance one's self-confidence or physical appearance. Other factors expected to increase the demand for drugs include greater personal income, the rising health consciousness and expectations of the general public, and a more industry-friendly regulatory environment that has streamlined the FDA approval process for "priority" drugs—those the FDA concludes are potentially life-saving treatments.

Despite the increasing demand for drugs, drug producers and buyers are expected to place more emphasis on cost-effectiveness, due to concerns about the cost of healthcare, including prescription drugs. Furthermore, innovative drug development measured by the number of industry applications submitted to the FDA has slowed dramatically, and the average time for the FDA to review "nonpriority" drug applications is becoming longer. Growing competition from the producers of generic drugs also may exert cost pressures on many firms in this industry, particularly as brand-name drug patents expire. These factors, combined with continuing improvements in manufacturing processes, are expected to result in slower employment growth over the 2002-12 period than occurred during the previous 10-year period.

Strong demand is anticipated for professional occupations—especially for the biological and medical scientists engaged in R&D, the backbone of the pharmaceutical and medicine manufacturing industry, and computer specialists such as systems analysts and computer support specialists. Strong demand also is projected for production occupations. Employment of office and administrative support workers is expected to grow more slowly than that of the industry as a whole, as companies streamline operations and increasingly rely on computers. In an effort to curb research and technological development costs, some companies have merged. As companies consolidate and grow in size, so do their marketing and sales departments. Despite substantial increases over the past decade, sales forces at pharmaceutical and medicine manufacturing firms should continue to experience strong growth.

Unlike many other manufacturing industries, the pharmaceutical and medicine manufacturing industry is not highly sensitive to changes in economic conditions. Even during periods of high unemployment, work is likely to be relatively stable in this industry.

Sources of Additional Information

For additional information about careers in pharmaceutical and medicine manufacturing and the industry in general, write to the personnel departments of individual pharmaceutical and medicine manufacturing companies.

For information about careers in biotechnology, contact:

- Biotechnology Industry Organization, 1625 K St. NW., Suite 1100, Washington, DC 20006.
Internet: <http://www.bio.org>

For information on careers in pharmaceutical and medicine manufacturing, contact:

- Pharmaceutical Research and Manufacturers of America (PHRMA), 1100 15th St. NW., Washington, DC 20005.
Internet: <http://www.phrma.org>

Information on these key pharmaceutical and medicine manufacturing occupations may be found in the 2004-05 edition of the *Occupational Outlook Handbook*.

- Assemblers and fabricators
- Biological scientists
- Chemists and material scientists
- Engineers
- Inspectors, testers, sorters, samplers, and weighers
- Medical scientists
- Sales representatives, wholesale and manufacturing
- Science technicians
- Systems analysts, computer scientists, and database administrators

SIGNIFICANT POINTS

- Most firms are small, employing fewer than 10 people.
- Computerization is changing or eliminating occupations, resulting in a slight decline in projected employment.

Nature of the Industry

The printing industry prints products ranging from newspapers, magazines, and books to brochures, labels, newsletters, postcards, memo pads, business order forms, checks, maps, T-shirts, and packaging. The industry also consists of establishments that provide related services to printers, such as embossing, binding, finishing, and prepress services. Commercial lithographic printing establishments, which print newspaper inserts, catalogs, pamphlets, and advertisements, make up the largest segment of the industry, accounting for about 40 percent of employment and 32 percent of total establishments. Establishments offering primarily digital printing, which is the most technologically advanced method of printing constitutes the smallest segment of the industry—about 3 percent of total employment. Much of the work of this segment is characterized by low volume, often done by very small shops or freelance workers. Another segment of the printing industry is quick printing. Quick printing establishments generally provide short-run printing and copying with fast turnaround times.

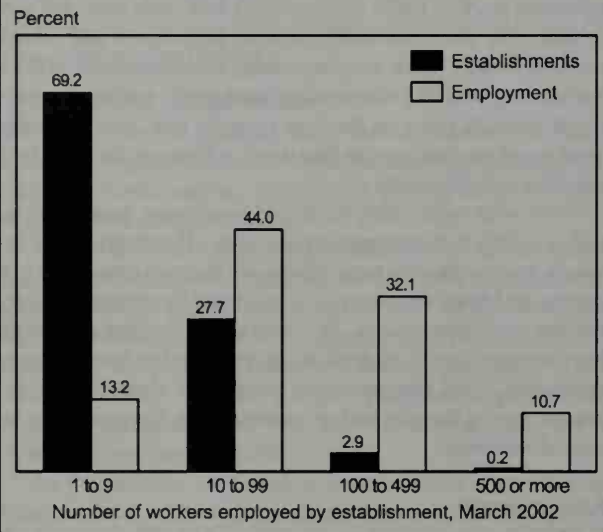
Printing is a large industry composed of many shops that vary in size. More than 2 of every 3 printing shops employ 10 or fewer workers. (See chart.) These small printing shops often are referred to as “job shops,” because what they print is determined by the needs of their customers.

There are five printing methods that use plates or some other form of image carrier—lithography, letterpress, flexography, gravure, and screen printing. Plateless or nonimpact processes, such as electronic, electrostatic, or inkjet printing, are used mainly for copying, duplicating, and specialty printing, usually in quick printing or in-house print shops.

Lithography, which uses the basic principle that water repels oil, remains the dominant printing process in the industry. Lithography lends itself to computer composition and the economical use of color, accounting for its dominance. Letterpress prints images from the raised surfaces on which ink sits; the sunken surfaces do not show up on the paper. The raised surfaces are generated by means of casting, acid etching, or photoemulsion. In the future, flexography, and gravure to a lesser extent, are expected to be more widely used than at present. Flexography produces vibrant colors with little ruboff, qualities valued for newspapers, directories, and books, which are its biggest markets. Gravure’s high-quality reproduction, flexible pagination and formats, and consistent print quality have won it a significant share of packaging and product printing and a growing share of periodical printing.

Another type of printing included in this industry is screen printing, also known as commercial screen printing. This

About 2 out of 3 establishments in printing employ fewer than 10 workers



method is used to print designs on clothes and other fabric items, such as caps or napkins. In response to environmental concerns, printers increasingly use alcohol-free solutions, water-based inks, and recycled paper.

The printing industry, like many other industries, continues to undergo technological changes, as computers and technology alter the manner in which work is performed. Many of the processes that were once done by hand are becoming more automated. Technology’s influence can be seen in all three stages of printing: *Prepress*, preparation of materials for printing; *press*, the actual printing process; and *postpress* or *finishing*, the folding, binding, and trimming of printed sheets into final form. The most notable changes have occurred in the prepress stage. Instead of cutting and pasting articles by hand, workers now produce entire publications on a computer, complete with artwork and graphics. Columns can be displayed and arranged on the computer screen exactly as they will appear in print, and then printed. Nearly all prepress work is becoming computerized, and prepress workers need more training in computers and graphic communications software. Printing processes today use scanners to input images and computers to manipulate and format the graphic images prior to printing. Digital printing also is transforming prepress operations as well as the printing process. It eliminates much of the lengthy process in transferring print files to the printing press by directly transferring

digital files to an electronically driven output device bypassing most prepress operations.

Working Conditions

The average nonsupervisory worker in the printing and related support activities industry worked 38.4 hours per week in 2002, compared with 40.5 hours per week across all manufacturing industries. Workers in the industry generally put in an 8-hour day, but overtime often is required to meet production deadlines. Larger companies tend to have shiftwork. There is a fair amount of flexibility with shift schedules and overtime options, which are based largely on seniority.

Working conditions vary by occupation. For example, press operators work in noisy environments and often wear ear protectors. On the other hand, prepress technicians and related workers usually work in quiet, clean, air-conditioned offices. Fortunately, with the advanced technology in machinery, there is not as much strain on the eyes as in the past. Most printing work involves dealing with fine detail, which can be tiring both mentally and physically.

Even with more safety-enhanced machinery, some workers still are subject to occupational hazards. Platemakers, for example, may work with toxic chemicals that can cause skin irritations, and press operators work with rapidly moving machinery that can cause injuries. In recent years, working conditions have become less hazardous as the industry has become more automated. Also, companies are using fewer chemicals and solutions than in the past and are experiencing fewer equipment-related accidents.

Employment

In 2002, the printing industry had about 710,000 wage and salary jobs, in addition to 33,000 self-employed workers, ranking it among the largest manufacturing industries. More than 13 percent of wage and salary jobs were in establishments employing fewer than 10 workers. (See chart.) About 40 percent were in the largest industry sector—commercial lithographic printing (table 1). Printing plants are widely dispersed throughout the country; however, more specialized types of printing tend to be regionally concentrated. For example, financial printing is concentrated in New York City.

Occupations in the Industry

Printing occupations range in skill from those found in quick printing to specialized production occupations rarely found in other industries (table 2). Printing machine operators still account for the most employment of any single occupation in the industry at 13.3 percent. However, relatively newer occupations such as graphic designers and desktop publishers are expected to experience the fastest growth.

Production occupations make up 52.3 percent of industry employment. *Prepress technicians and workers* prepare material for printing presses. Included among their tasks are: Composing text; designing page layout incorporating text, photographs and illustrations, and advertisements, if any; and making printing plates of the pages. Increasingly, prepress technicians receive the material for the pages as electronic computer files, which they load into their computers, and use digital imaging

Table 1. Establishments and wage and salary employment in printing by detailed industry, 2002

Industry segment	Establishments	Employment
Total	100.0	100.0
Commercial lithographic printing	32.2	39.6
Commercial gravure printing	1.1	2.6
Commercial flexographic printing	4.1	6.1
Commercial screen printing	11.9	9.4
Quick printing	26.6	11.2
Digital printing	2.9	2.6
Manifold business forms printing	2.4	6.3
Books printing	1.4	4.9
Blankbook and looseleaf binder manufacturing	0.6	1.7
Other commercial printing	8.2	6.9
Trade binding and related work	2.8	3.4
Prepress services	6.0	5.4

software to layout the pages. “Preflight” technicians examine and edit the pages to ensure that the design, format, settings, quality and all other aspects of the automated desktop work are acceptable, and that the finished product will be completed according to the client’s specifications before it is printed.

Printing plants that use older technology, which are declining in number, may still employ people in older, manual occupations. These include *typesetting* and *composing machine operators* to prepare text. *Camera operators* start the process of making a lithographic plate by photographing and developing negatives of the material to be printed. *Scanner operators* employ electronic or computerized scanning equipment to produce and screen film separations of photographs or art to use in lithographic printing plates. Operators review all work and adjust the equipment if they need to make corrections to the original. *Lithographic dot etchers* retouch negatives by sharpening or reshaping the images on the negatives. They work by hand, using chemicals, dyes, and special tools. *Film strippers* cut the film to required size and arrange and tape the pieces of negatives onto “flats,” or layout sheets, used to make press plates. *Platemakers* produce printing plates by exposing sensitized metal sheets to special light through a photographic negative. Some platemakers operate machines that process the plates automatically. In letterpress and gravure printing, *photoengravers* photograph copy, develop negatives, and prepare photosensitized metal plates for use.

When the material is ready, *printing machine operators* install and adjust the printing plate on the press, mix fountain solution, adjust pressure, ink the printing presses, load paper, and adjust the press to paper size. Operators also must correct any problems that might occur during a press run. *Job printers*, who usually work in small print shops, perform the prepress work as well as operate the press.

During the binding or postpress stage, the printed sheets are transformed into products such as books, catalogs, magazines, or directories. *Bookbinders* assemble books from large, flat, printed sheets of paper. They cut, saw, and glue parts to bind new books and perform other finishing operations, such as decorating and lettering, often using handtools.

A small number of bookbinders work in hand binderies. These highly skilled workers design original or special bindings for publications with limited editions, or restore and rebind

Table 2. Employment of wage and salary workers in printing by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	710	100.0	3.3
Management, business, and financial occupations	54	7.6	11.9
Top executives	19	2.7	9.4
Marketing and sales managers	5	0.7	19.0
Industrial production managers	6	0.9	12.0
Cost estimators	6	0.9	12.0
Professional and related occupations	30	4.2	17.7
Computer specialists	8	1.1	13.6
Graphic designers	14	2.0	23.2
Sales and related occupations	39	5.4	10.8
Sales representatives, wholesale and manufacturing, except technical and scientific products	23	3.3	12.0
Office and administrative support occupations	138	19.4	-1.3
First-line supervisors/managers of office and administrative support workers	8	1.1	-4.0
Bookkeeping, accounting, and auditing clerks	11	1.6	-4.5
Customer service representatives	26	3.6	12.0
Order clerks	6	0.9	-17.5
Production, planning, and expediting clerks	7	1.0	12.0
Shipping, receiving, and traffic clerks	14	1.9	-10.8
Secretaries and administrative assistants	8	1.2	-8.6
Desktop publishers	9	1.3	25.9
Office clerks, general	10	1.3	-2.5
Installation, maintenance, and repair occupations	12	1.6	11.9
Production occupations	371	52.3	2.2
First-line supervisors/managers of production and operating workers	27	3.8	12.0
Bindery workers	65	9.1	-11.8
Bookbinders	6	0.8	0.6
Job printers	34	4.8	13.2
Prepress technicians and workers	52	7.3	-10.8
Printing machine operators	94	13.3	10.1
Cutting and slicing machine setters, operators, and tenders	11	1.5	12.0
Inspectors, testers, sorters, samplers, and weighers	8	1.1	-2.2
Paper goods machine setters, operators, and tenders	9	1.2	12.0
Helpers—Production workers	21	2.9	0.8
Transportation and material moving occupations	62	8.8	-0.8
Truck drivers, light or delivery services	8	1.1	8.6
Laborers and freight, stock, and material movers, hand	13	1.8	-8.0
Machine feeders and offbearers	17	2.4	0.8
Packers and packagers, hand	13	1.8	-2.4

NOTE: May not add to totals due to omission of occupations with small employment.

rare books. In many other shops, *bindery workers* fold and fasten groups of sheets together, often using a machine stapler, to make "signatures." They then feed the signatures into various machines for stitching or gluing. More of these workers are

now using computers on the job, and consequently must learn new skills to operate the more complex machinery.

In addition to these specialized printing occupations, office and administrative support workers, marketing and sales workers, workers in professional and related occupations, and management, business, and financial operations workers also are employed in the printing industry. One occupation becoming more common is customer service representative; workers in this job track the various processes of production and act as liaison between clients and technicians. The representative ensures the customer's satisfaction with the timely delivery of a high-quality product. Also important are *graphic designers*, who use a variety of print and film media to create and execute art that meets a client's needs. They increasingly use computers to lay out and test various designs, patterns, and colors before printing a final design.

Training and Advancement

Workers enter the industry with various educational backgrounds. In general, job applicants must be high school graduates with mathematical, verbal, and written communication skills, and be computer literate.

Helpers generally have a high school or vocational school background, and management trainees may have a college background. Formal graphic arts programs, offered by community and junior colleges and some 4-year colleges, provide an introduction to the industry. Training in desktop publishing is particularly useful. Bachelor's degree programs in graphic arts prepare persons who may want to enter management, and 2-year programs provide technical skills.

As the industry continues to become more computerized, most workers will need a working knowledge of computers. Courses in electronics and computer technology are beneficial for anyone entering the industry, and some employers will offer tuition assistance or continuing education classes.

In the past, apprenticeships were quite common for specialized printing occupations. Now, workers usually are trained informally on the job. Hand bookbinders are one exception. These workers usually need a 4-year apprenticeship to learn the craft of restoring rare books and producing valuable collector's items.

The length of on-the-job training needed to learn skills varies by occupation and shop. For example, press operators begin as helpers and advance to press operator positions after years of training. Bindery workers begin by doing simple tasks such as moving paper from cutting machines to folding machines. Workers learn how to operate more complicated machinery within a few months. Training often is given under the close supervision of an experienced or senior employee. Through experience and training, workers may advance to more responsible positions. Workers usually begin as helpers, advance to skilled craft jobs, and eventually may be promoted to supervisor.

Opportunities for advancement depend on the specific plant or shop. Technological changes will continue to introduce new types of computerized equipment or dictate new work procedures. Workers with computer and mechanical aptitude are especially in demand, so proper training or retraining will be essential to careers in printing.

Earnings

In 2002, average weekly earnings for production workers in the printing industry were \$573, compared with \$619 for all production workers in manufacturing. Weekly wages in the printing industry can vary significantly by industry sector ranging from \$431 in commercial screen printing, to \$638 in commercial lithograph printing. Average hourly earnings of the largest occupations in the industry also vary as shown in table 3.

The principal union in this industry is the Graphic Communications International Union. About 6 percent of printing industry employees are union members or are covered by a union contract, compared with 15 percent of workers throughout the economy, but this proportion varies greatly from city to city.

Table 3. Median hourly earnings of the largest occupations in printing, 2002

Occupation	Printing	All industries
General and operations managers	\$35.93	\$32.80
Sales representatives, wholesale and manufacturing, except technical and scientific products	23.90	20.54
First-line supervisors/managers of production and operating workers	21.88	20.64
Prepress technicians and workers	16.05	14.98
Printing machine operators	15.02	13.95
Customer service representatives	14.89	12.62
Job printers	14.84	14.47
Bindery workers	11.02	10.51
Machine feeders and offbearers	10.49	10.50
Helpers—production workers	10.18	9.25

Outlook

Wage and salary employment in the printing and related support activities industry is projected to grow 3.3 percent over the 2002-12 period, compared with the 16 percent growth projected for the economy as a whole. This modest growth reflects the expanding use of the Internet, which reduces the need for printed materials, and the increasing computerization of the printing process. The printing industry, though, will continue to supply products for education, business, and leisure for a long time to come. Although technological innovation and automation, mergers between and acquisitions of small and medium-size printing firms, and partnering services offered among printing firms will curb job growth, certain sectors of the industry will experience more employment increase than will others.

Employment in support activities for printing is expected to decline because more companies are preparing printing and performing postpress in-house. Employment in commercial printing companies is projected to rise, but only modestly, as digital printing technology allows clients to perform more work in-house. Employment in manifold business forms should continue to decrease as firms take customers' orders over the Internet, a development that allows companies to disseminate purchasing information throughout all departments much more

easily. Declining employment in blankbooks and looseleaf binding firms also reflects increased competition from imports and a shrinking export market share for this industry segment.

Employment growth will differ among the various occupations in the printing industry, largely because of technological advances. Processes currently performed manually are being computerized, causing a shift from craft occupations to related occupations that perform the same function. For example, employment of desktop publishing specialists is expected to increase much faster than the average for all occupations over the 2002-12 period as the elements of print production, including layout, design, and printing, increasingly are performed electronically. In contrast, demand for prepress technicians and workers—particularly those who perform these tasks manually, including pasteup workers, photoengravers, camera operators, film strippers, and platemakers—is expected to decline. Job printers, however, are expected to experience growth as some firms contract out typesetting and composition work to the small shops in which job printers are primarily employed. In response to the growth in electronic printing, employment of press operators is expected to decline, as is that of bookbinders and bindery workers.

New technology and equipment will require workers to update their skills to remain competitive in the job market. For example, pasteup workers will have to learn how to lay out pages using a computer or face losing their jobs. The concepts and principles behind page layout and design are unchanged, but the workers will have to learn how to perform their work using different tools.

Sources of Additional Information

Information on apprenticeships and other training opportunities may be obtained from local employers such as printing shops, local offices of the Graphic Communications International Union, local affiliates of Printing Industries of America, or local offices of the State employment service.

For general information on careers and training programs in printing, contact:

- Graphic Communications Council, 1899 Preston White Dr., Reston, VA 20191-5468.
Internet: <http://www.teched.vt.edu/gcc>
- Graphic Arts Technical Foundation, 200 Deer Run Rd., Sewickley, PA 15143-2600. Internet: <http://www.gain.net>
- Graphic Communications International Union, 1900 L St. NW., Washington, DC 20036-5002.
Internet: <http://www.gciu.org>
- National Association for Printing Leadership, 75 W. Century Rd., Paramus, NJ 07652-1408.
Internet: <http://www.napl.org>
- Printing Industries of America, 100 Daingerfield Rd., Alexandria, VA 22314-2886.
Internet: <http://www.gain.net>

Information on most occupations in the printing and publishing industry, including the following, may be found in the 2002-03 *Occupational Outlook Handbook*:

- Artists and related workers
- Bookbinders and bindery workers
- Desktop publishers
- Prepress technicians and workers
- Printing machine operators

SIGNIFICANT POINTS

- Employment is expected to continue to decline due to consolidation and further automation of the steelmaking process.
- Employers staffing production jobs increasingly prefer individuals with 2-year degrees in mechanical or electrical technology.
- Opportunities will be best for engineers, computer scientists, business majors, and skilled production workers.

Nature of the Industry

Faced with international competition and a worldwide glut of steel, the U.S. steel industry continues to respond by modernizing its manufacturing processes and consolidating businesses to increase productivity. Despite successful efforts to reduce costs and an improving competitive position, steel manufacturing firms still face stiff competition—and employment is expected to continue to decline. However, investment in modern equipment and worker training has transformed the U.S. steel industry from one of the Nation's most moribund to one of the world's leaders in worker productivity and the lowest cost producer for some types of steel.

Establishments in this industry produce steel by melting iron ore, scrap metal, and other additives in furnaces. The molten metal output is then solidified into semifinished shapes before it is rolled, drawn, cast, and extruded to make sheet, rod, bar, tubing, and wire. Other establishments in the industry make finished steel products directly from purchased steel.

The least costly method of making steel uses scrap metal as its base. Steel scrap from many sources—such as old bridges, refrigerators, and automobiles—and other additives are placed in an electric arc furnace, where the intense heat produced by carbon electrodes melts the scrap, converting it into molten steel. Establishments that use this method of producing steel are called electric arc furnace (EAF) mills, or minimills. The smaller initial capital investment required to start and operate an EAF mill has helped drive the growth of this production method. Moreover, scrap metal is found in all parts of the country, so EAFs are not tied as closely to raw material deposits as are integrated mills and can be placed closer to consumers. EAFs now account for about half of American steel production, and their share is expected to continue to grow in coming years.

The growth of EAFs comes partly at the expense of integrated mills. Integrated mills reduce iron ore to molten pig iron in blast furnaces. The iron is then sent to the oxygen furnace, where it is combined with scrap to make molten steel. The steel produced by integrated mills generally is considered to be of higher quality than steel from EAFs but, because more steps are involved in the production process, it also is more costly. The initial step in the integrated mill process is to prepare coal for use in a blast furnace by converting it to coke. Coal is heated in coke ovens to remove impurities and to reduce it to nearly pure carbon.

At the other end of the steel manufacturing process, semifinished steel from either EAFs or integrated mills is converted into finished products. Some of the goods produced in finishing mills are steel wire, pipe, bars, rods, and sheets. Products also may be coated with chemicals, paints, or other metals that give the steel desired characteristics for various industries and consumers. Also involved in steel manufacturing are firms that produce alloys by adding materials such as silicon and manganese to the steel. Varying the amounts of carbon and other elements contained in the final product can yield thousands of different types of steel, each with specific properties suited for a particular use.

Steel companies, like most businesses, have entered the era of sophisticated technology. Taking several forms, this technology has improved both product quality and worker productivity. Computers are essential to most technological advances in steel production, from production scheduling and machine control to metallurgical analysis. Computerized systems change the nature of many jobs, while they eliminate or reduce the demand for others.

For workers, modernization of integrated and EAF steel mills often has meant learning new skills to operate sophisticated equipment. Competition also has resulted in increasing specialization of steel production, as various producers attempt to capture different niches in the market. With these changes has come a growing emphasis on flexibility and adaptability for both workers and production technology. As international and domestic competition continue for U.S. steel producers, the nature of the industry and the jobs of its workers are expected to continue to change.

Working Conditions

Steel mills evoke images of strenuous, hot, and potentially dangerous work. While many dangerous and difficult jobs remain in the steel industry, modern equipment and facilities have helped to change this. The most strenuous tasks were among the first to be automated. For example, computer-controlled machinery helps to monitor and move iron and steel through the production processes, reducing the need for heavy labor. In some cases, workers now monitor and control the equipment from air-conditioned rooms.

Nevertheless, large machinery and molten metal can be hazardous unless safety procedures are observed. Hardhats, safety

shoes, protective glasses, earplugs, and protective clothing are required in most production areas.

Cases of occupational injury and illness in the industry were 8.6 per 100 full-time workers in 2002, higher than the 5.3 cases per 100 workers for the entire private sector and slightly higher than the 7.2 cases per 100 for all of manufacturing.

The expense of plant and machinery and significant production startup costs force most mills to operate around the clock, 7 days a week. Workers averaged 43 hours per week in 2002, and only about 2 percent of workers are employed part time. Workers typically work varying shifts, switching between working days one week and nights the next. Some mills operate two 12-hour shifts, while others operate three 8-hour shifts. Over-time work during peak production periods is common.

Employment

Employment in the steel industry declined to about 170,000 wage and salary jobs in 2002, 80,000 fewer than in 1992. The steel industry traditionally has been located in the eastern and midwestern regions of the country, where iron ore, coal, or one of the other natural resources required for steel are found. Even today, about 46 percent of all steelworkers are employed in Pennsylvania, Ohio, and Indiana. The growth of EAFs has allowed steelmaking to spread to virtually all parts of the country, although many firms find lower cost rural areas the most attractive. Large firms employ most workers in the steel industry. More than 65 percent of the jobs in 2002 were in establishments employing at least 250 workers (chart 1).

Occupations in the Industry

Opportunities exist in steel manufacturing in a variety of occupations, but the largest group of workers—47 percent—is employed in production occupations (table 1). Other large groups of workers are installation, maintenance, and repair workers and transportation and material-moving workers.

More than 65 percent of the jobs in steel manufacturing are in establishments that employ 250 or more workers



Although the steel making procedure varies with the type of furnace used, the jobs associated with the various processes are similar. Most jobs in steel mills can be classified into 1 of 3 types: Operators, maintenance and repair workers, and supervisors and managers. In addition, significant numbers of electricians, engineers, inspectors and testers, and material-moving workers are needed to assist in the production process and repair of equipment. Workers generally are assigned to work in a particular sector of the production line, such as the blast furnace or rolling mill areas, and their titles reflect the types of machines they work on.

At integrated mills, production begins when *material-moving* workers load iron ore, coke, and limestone into the top of a blast furnace. As the materials are heated, a chemical reaction frees the iron from other elements in the ore. *Metal-refining furnace operators and tenders*, also known as *blowers* and *melters*, direct the overall operation of the furnace to melt and refine metal before casting or to produce specific types of steel. They gather information on the characteristics of the raw materials they will use and the type and quality of steel they are expected to produce. They direct the loading of the furnace with raw materials and supervise the taking of samples, to ensure that the steel has the desired qualities. They may also coordinate the loading and melting of raw materials with the steel molding or casting operation to avoid delays in production.

Generally, either a basic oxygen or an electric arc furnace is used to make steel. Operators and tenders use controls to tilt the furnace to receive the raw materials. Once they have righted the furnace, they use levers and buttons to control the flow of oxygen and other materials into the furnace. During the production process, *testers* routinely take samples to be analyzed. Based on this analysis, operators determine how much longer they must process the steel or what materials they must add to meet specifications. Operators also pay close attention to conditions within the furnace and correct any problems that arise during the production process.

Metal pourers and casters tend machines that release the molten steel from the ladle at a controlled rate into water-cooled molds, where it solidifies into semifinished shapes. This process is called "continuous casting." These shapes are then cut to desired lengths as they emerge from the caster. During this process, operators monitor the flow of raw steel and the supply of water to the mold.

The "rolling" method is used to shape most steel processed in steel mills. In this method, hot steel is squeezed between two cylinders, or "rollers," which flatten or shape the steel. *Rolling machine operators* operate the rolling mills that produce the finished product; the quality of the product and the speed at which the work is completed depend on the operator's skills. Placing the steel and positioning the rollers are very important, for they control the product's final shape. Improperly adjusted equipment may damage the rolling mill or gears.

Extruding and drawing machine operators control equipment that extrudes, or draws, metal materials into tubes, rods, hoses, wire, bars, or structural shapes. *Cutting, punching, and press machine operators* operate machines that saw, cut, shear, slit, punch, crimp, notch, bend, or straighten metal. *Welding, soldering, and brazing workers* join metal components or fill

holes, indentations, or seams of fabricated metal products. *Multiple machine tool operators* are skilled in the operation of more than one type of cutting or forming machine tool or robot.

Team assemblers and leaders work as part of a team responsible for assembling an entire product or component of a product. Team assemblers can perform all tasks conducted by the team in the assembly process and rotate through all or most of them rather than being assigned to a specific task on a permanent basis. They may participate in making management decisions affecting the work. *Machinists* operate a variety of machine tools to produce precision parts and instruments. They may fabricate and modify parts to make or repair machine tools or maintain industrial machines. *Inspectors, testers, sorters, samplers, and weighers* check parts or products for defects, wear, and deviations from specifications.

Millwrights are employed to install and maintain much of the sophisticated machinery in steel mills. As the technology becomes more advanced, they work more closely with *electricians*, who help repair and install electrical equipment such as computer controls for machine tools.

Engineers, chemists, and computer specialists are playing an increasing role at steel mills, helping to address a variety of issues. *Industrial engineers* make plants more productive and energy efficient by designing and installing the latest technology. *Mechanical engineers* often are found in supervisory or management jobs, helping to solve mechanical problems on the production line. *Environmental engineers* design environmental control systems to maintain water and air quality standards or to clean up old sites. *Metallurgical engineers* work with the metals and ores that go into steel in order to change or improve its properties or to find new applications for steel.

Additionally, as with most companies, there are accountants, sales agents, various managers, and administrative and clerical workers who run the company and process paperwork.

Training and Advancement

Many jobs in steel manufacturing require only a high school diploma. However, machinery continues to become more complex, and growing numbers of operating and maintenance positions are highly skilled, so employers increasingly prefer to hire graduates from formal postsecondary technical and trade schools. Two-year degrees in mechanical or electrical technology or 2- to 4-year apprenticeships are recommended for persons seeking to advance into the best production jobs.

After production workers are hired, they receive specific training on the job. New workers entering the production process as lower skilled operators and maintenance personnel generally assist more experienced workers, beginning with relatively simple tasks. As workers acquire experience, they specialize in a particular process and acquire greater skill in that area. The time required to become a skilled worker depends upon individual abilities, acquired skills, and available job openings. It generally takes at least 2 to 5 years, and sometimes longer, to advance to a skilled position. At times, workers

Table 1. Employment of wage and salary workers in steel manufacturing by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	170	100.0	-20.0
Management, business, and financial occupations	10	5.7	-13.4
Industrial production managers	2	1.0	-14.0
Professional and related occupations	8.1	4.8	-17.2
Industrial engineers, including			
health and safety	1.0	0.5	-16.3
Materials engineers	1.0	0.5	-19.7
Mechanical engineers	1.0	0.5	-14.8
Engineering technicians, except drafters	1.0	0.7	-17.7
Sales and related occupations	2.4	1.4	-11.9
Office and administrative support occupations	14.0	8.2	-24.9
Production, planning, and expediting clerks	3.3	2.0	-20.6
Shipping, receiving, and traffic clerks	1.8	1.1	-22.0
Construction and extraction occupations	7.9	4.7	-16.9
Electricians	3.6	2.1	-13.3
Installation, maintenance, and repair occupations	20.6	12.1	-21.7
Industrial machinery mechanics	2.3	1.4	-20.0
Maintenance and repair workers, general	6.6	3.9	-16.6
Millwrights	4.3	2.5	-29.4
Production occupations	79.6	46.8	-19.1
First-line supervisors/managers of production and operating workers	7.7	4.5	-16.0
Extruding and drawing machine setters, operators, and tenders, metal and plastic	5.3	3.1	-12.8
Rolling machine setters, operators, and tenders, metal and plastic	5.9	3.5	-24.2
Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	7.9	4.6	-18.0
Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	2.0	1.0	-19.6
Machinists	3.1	1.8	-12.1
Metal-refining furnace operators and tenders	3.4	2.0	-28.1
Pourers and casters, metal	1.8	1.1	-34.4
Multiple machine tool setters, operators, and tenders, metal and plastic	1.0	0.9	-1.0
Welders, cutters, solderers, and brazers	3.6	2.1	-11.6
Heat treating equipment setters, operators, and tenders, metal and plastic	2.2	1.3	-19.0
All other metal workers and plastic workers	3.8	2.2	-30.2
Inspectors, testers, sorters, samplers, and weighers	5.3	3.1	-15.8
Helpers—Production workers	3.9	2.3	-23.1
Transportation and material moving occupations	26.2	15.4	-23.3
Crane and tower operators	6.4	3.8	-20.9
Industrial truck and tractor operators	3.7	2.2	-15.7
Laborers and freight, stock, and material movers, hand	6.6	3.9	-30.1
Machine feeders and offbearers	3.6	2.1	-28.7

NOTE: May not add to totals due to omission of occupations with small employment.

change their specialization to increase their opportunities for advancement. Workers are continuously trained to perform a variety of tasks and provide more flexibility to the firm, as company needs change. Computers have become important, as companies have modernized. Workers must learn to operate computers and other advanced equipment.

To work as an engineer or scientist, or in some other technical occupations in the steel industry, a college education is necessary. Many workers in administrative and managerial occupations have degrees in business or possess a combination of technical and business degrees. A master's degree may give an applicant an advantage in getting hired or help an employee advance. Managers need strong problem-solving, planning, and supervisory skills.

Earnings

Earnings in the steel industry vary by type of production and occupation but are higher than average earnings in private industry. Average weekly earnings of nonsupervisory production workers in 2002 were \$968 in iron and steel mills, and \$687 in establishments making steel products from purchased steel, compared with \$619 in all manufacturing and \$506 throughout private industry. Earnings in selected occupations in steel manufacturing appear in table 2.

Union membership, geographic location, and plant size affect earnings and benefits of workers. In most firms, earnings or bonuses are linked to output. Workers receive standard benefits, including health insurance, paid vacation, and pension plans.

The iron and steel industry traditionally has been highly unionized. In 2002, 37 percent of workers in steel manufacturing were members of unions or covered by union contracts, compared with 16 percent in manufacturing and 15 percent in all industries. In some instances, companies are closed shops—that is, workers must belong to the union in order to work there. EAFs, though, typically are nonunion. The overall decline of employment in traditional integrated steel mills, together with the growth of EAFs, have caused union membership to decline in recent years.

Outlook

Employment in the steel industry is expected to decline 20 percent over the 2002-12 period, primarily due to increasing consolidation in the industry as companies go out of business or are bought by other companies in the industry and their operations merge. A worldwide glut of steel and production overcapacity domestically, unless checked, will cause prices to decline to unprofitable levels and require mills to either become more productive or go out of business. As mills either consolidate or close, the result will be fewer workers, but a more productive industry that will be better able to meet foreign competition.

EAF mills, with their leaner workforce and lower cost structure, are expected to benefit from the industry's transformation and will continue to gain market share. They now produce nearly 50 percent of the country's steel, up from 25 percent two decades ago. They are also attempting to improve the quality of the steel they make by melting pig iron along with the scrap. In this way, they can more effectively compete with integrated mills in markets that demand higher quality steel. Thus, as EAFs continue to grow in relation to integrated mills, job opportunities will be better at these mills.

Automation, computerization, and changes in business practices that have led to a leaner workforce have reduced the number of man-hours needed to produce a ton of steel and raised productivity enormously in the last few decades. These productivity improvements, which were a leading cause of employment declines in the past, are not expected to be as powerful a factor in the future, as some companies have automated the process as much as they can. Technological improvements, however, will continue to be made, impacting the number and type of workers hired. Low-skilled jobs will continue to be automated and the jobs that remain will require more education and training.

Employment in the steel industry varies with overall economic conditions and the demand for goods produced with steel. For example, as the automotive industry produces more cars and light trucks, it will purchase more steel. In this way, much of the demand for steel is derived from the demand for other

Table 2. Median hourly earnings of the largest occupations in steel manufacturing, 2002

Occupation	Iron and steel ferroalloy manufacturing	Steel product manufacturing from purchased purchased steel	All industries
First-line supervisors/managers of production and operating workers	\$24.96	\$21.80	\$20.64
Electricians	20.67		19.90
Millwrights	20.60		20.19
Production, planning, and expediting clerks	19.70		16.18
Maintenance and repair workers, general	19.33	17.39	14.12
Crane and tower operators	18.40	15.48	17.47
Machine feeders and offbearers	18.37		10.50
Metal-refining furnace operators and tenders	18.17		14.79
Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	15.40	13.05	11.81
Laborers and freight, stock, and material movers, hand	14.76	11.77	9.48

products. Other industries that are significant users of steel include manufacturers of structural metal products, motor vehicle parts and equipment, and household appliances. As many of these goods require a large outlay, consumers are more likely to purchase them in good economic times.

Despite the projected decline, job openings are expected to be very good or favorable for a number of occupations. Demand for all types of engineers, including mechanical, metallurgical, industrial, electrical, and civil, is expected to be very good. Companies report great difficulty in hiring these highly skilled professionals. Also, computer scientists and business majors should be in great demand. For skilled production jobs, workers with associate degrees in technology will be highly sought after to operate computer-controlled machines and to repair equipment. Among persons without postsecondary training, those who have good math and computer skills will have better opportunities to be hired and trained for skilled production jobs. Those without a degree must be flexible and willing to go through extensive classroom and on-the-job training. Keen competition can be expected for low-skilled material handling and machine operator jobs, for which employment is expected to decline. Despite the declines in employment, many workers will need to be hired to replace those who leave the industry or retire. Especially at the integrated mills, a large number of workers is expected to retire over the next decade.

Sources of Additional Information

For additional information about careers and training in the steel industry, contact:

- American Iron and Steel Institute, 1101 17th St. NW., Suite 1300, Washington, DC 20036-4700.
Internet: <http://www.steel.org>
- Steel Manufacturers Association, 1150 Connecticut Ave., NW., Suite 715, Washington, DC 20036.
Internet: <http://www.steelnet.org>

Information on the following occupations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Assemblers and fabricators
- Electricians
- Engineering technicians
- Engineers
- Industrial machinery installation, repair, and maintenance workers, except millwrights
- Inspectors, testers, sorters, samplers, and weighers
- Machine setters, operators, and tenders—metal and plastic
- Machinists
- Material moving occupations
- Millwrights

Textile Mills and Products

(NAICS 313, 314)

SIGNIFICANT POINTS

- Extensive on-the-job training is required to operate new high-tech machinery.
- Production workers account for more than 3 out of 5 jobs.
- Employment is expected to decline, due to technological advances and an open trading environment.
- About 3 out of 5 jobs are in three States—North Carolina, South Carolina, and Georgia.

Nature of the Industry

The textile mills and products industry comprises establishments that produce yarn, thread, and fabric and also a wide variety of textile products for use by individuals and businesses, but not including apparel. Some of the items made in this industry include household items, such as carpets and rugs, towels, curtains, and sheets; cord and twine; furniture and automotive upholstery; and industrial belts and fire hoses. The process of converting raw fibers into finished nonapparel textile products is complex; thus, most textile mills specialize. In general, there is little overlap between knitting and weaving mills, or among mills that produce cotton and wool fabrics.

Textile mills take natural and synthetic fibers, such as cotton and polyester and transform them into yarn, thread, or webbing. Yarns are strands of fibers in a form ready for weaving, knitting, or otherwise intertwining to form a textile fabric. They form the basis for most textile production and commonly are made of cotton, wool, or synthetic fiber, such as polyester. Yarns also can be made of thin strips of plastic, paper, or metal. To produce spun yarn, natural fibers, such as cotton and wool, must first be processed to remove impurities and give products the desired texture and durability, as well as other characteristics. After this initial cleaning stage, the fibers are spun into yarn.

Fabric and textile products are mostly produced by means of weaving, knitting, and tufting. Workers in weaving mills use looms to transform yarns into cloth, a process that has been known for centuries. Looms weave or interlace two yarns, so they cross each other at right angles to form fabric. Although modern looms are complex, automated machinery, the principle remains the same as in ancient times.

Knitting is another method of transforming yarn into fabric. Knitting interlocks a series of loops of one or more yarns to form familiar goods, such as sweaters. However, unlike the knitting done with hand-held needles, knitting in the textile industry is performed on automated machines. Many consumer items, such as socks, panty hose, and underwear, are produced from knitted fabric.

Tufting, used by carpeting and rug mills, is a process by which a cluster of soft yarns is drawn through a backing fabric. These yarns project from the backing's surface in the form of cut yarns or loops to form the familiar texture of many carpets and rugs.

At any time during the production process, a number of processes, called finishing, may be performed on the fabric. These processes, which include dyeing, bleaching, and stonewashing, among others, may be performed by the textile mill or at a separate finishing mill. Finishing encompasses chemical or mechanical treatments performed on fiber, yarn, or fabric to improve appearance, texture, or performance. Mechanical finishes can involve brushing, ironing, or other physical treatments used to increase the luster and feel of textiles. Application of chemical finishes to textiles can impart a variety of properties ranging from decreasing static cling to increasing flame resistance. The most common chemical finishes are those that ease fabric care, such as the permanent-press and stain-resistant finishes.

Dyeing operations are used at various stages of production to add color and intricacy to textiles and increase product value. Textiles are dyed using a wide range of dyestuffs, techniques, and equipment. Most fabric that is dyed, printed, or finished must first be prepared. In preparation, the mill removes natural impurities or processing chemicals that interfere with dyeing, printing, and finishing. Typical preparation treatments include desizing, scouring, and bleaching. Finally the finished cloth is fabricated into a variety of household and industrial products.

Regardless of the process used, mills in the textile industry are rapidly modernizing, as new investments in automation and information technology have been made necessary by growing domestic and international competition. Firms also have responded to competition by developing new products and services. For example, some manufacturers are producing textiles developed from fibers made from recycled materials. These innovations have had a wide effect across the industry. Advanced machinery is boosting productivity levels in textiles, costing some workers their jobs, while fundamentally changing the nature of work for others. New technology also has led to broad and increasingly technical training for workers throughout the industry.

The emphasis in the industry continues to shift from mass production to flexible manufacturing, as textile mills aim to supply customized markets. Firms are concentrating on systems that allow small quantities to be produced with minimum leadtime. This flexibility brings consumer goods to retailers significantly faster than before. Information technology allows

the retail industry to rapidly assess its needs and communicate them back through the apparel manufacturer to textile firms.

Working Conditions

Working conditions vary greatly. Production workers, including front-line managers and supervisors, spend most of their shift on or near the production floor. Some factories are noisy and can have airborne fibers and odors; but most modern textile facilities are relatively clean, well lit, and ventilated.

In 2002, work-related injuries and illnesses in the textile mill products industry averaged 5.2 per 100 full-time workers, compared with 7.2 percent for all manufacturing and 5.3 percent for the entire private sector. This record has been achieved in part by requiring, when appropriate, the use of protective shoes, clothing, facemasks, and earplugs. Also, new machinery is designed with additional protection, such as noise shields. Still, many workers in production occupations must stand for long periods while bending over machinery, and noise and dust still are a problem in some plants. Workers are also sometimes exposed to hazardous situations that could produce cuts or minor burns if proper safety practices are not observed. Also, some workers are occasionally exposed to the fumes and odors of coolants and lubricants used in machines.

Because many mills run 24 hours a day as the cost of new machinery continues to increase, production workers may work evenings and weekends. Many operators work on rotating schedules, which can cause sleep disorders and other stress from constant changes in work hours. Production workers in textile mills averaged 3.4 overtime hours per week in 2002. Overtime is common for these workers during periods of peak production. Managerial and administrative support personnel typically work a 5-day, 40-hour week in an office setting, although some of these employees also may work significant overtime. Quality control inspectors and other workers may need to travel to other production sites, especially if working for large companies.

Employment

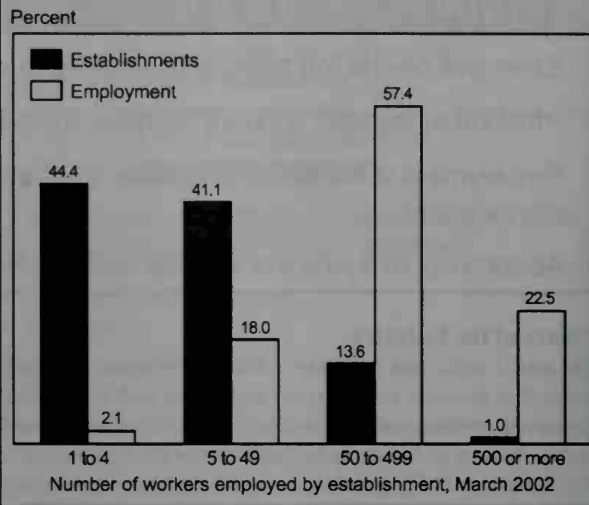
Most of the 489,000 wage and salary workers employed in the textile mills and products industry in 2002 were found in southeastern States. North Carolina accounted for about 28 percent of textile jobs. South Carolina and Georgia combined to provide employment for another 29 percent of the workers in this industry. The remaining jobs primarily were found in other areas of the South, California, and the Northeast.

Most textile production is concentrated in large mills. In fact, establishments employing more than 50 persons accounted for almost 80 percent of all textile workers (see chart).

Occupations in the Industry

The textile industry offers employment opportunities in a variety of occupations, but production occupations accounted for almost 64 percent of all jobs. Some of these production occupations are unique to the industry. (See table 1.) Additional opportunities also exist in material-moving, administrative support, maintenance, repair, management, and professional occupations. The industry also employs a small number of workers in service and sales occupations.

About 80 percent of the jobs in textile mills and products are in establishments employing 50 or more workers



Many workers enter the textile industry as *machine setters and operators*, the largest occupational group in the industry. They are responsible for setting each machine and monitoring its operation. They inspect their machines to determine if they need repairs or adjustments. They may clean and oil their machines, and repair or replace worn parts. Additionally, they must diagnose problems when the machinery stops and restart it as soon as possible, to reduce costly machine idle time. Textile machine setters and operators also install, level, and align components such as gears, chains, dies, cutters, and needles.

Textile machine setters and operators thread yarn, thread, or fabric through guides, needles, or rollers. Extruding machine operators load chemicals or wood pulp into their machines. They adjust the controls for proper tension, speed, and heat; for electronically controlled equipment, they program controls or key in instructions using a computer keyboard. Operators then start the machines and monitor their operation, observing control panels and gauges to detect problems.

Skilled production occupations also include *quality control inspectors*, who use precision measuring instruments and complex testing equipment to detect product defects, wear, or deviations from specifications.

Among installation, maintenance, and repair occupations, *industrial machinery mechanics* account for about 2 percent of industry employment. They inspect machines to make sure they are working properly. They clean, oil, and grease parts and tighten belts on a regular basis. When necessary, they make adjustments or replace worn parts and put the equipment back together. Mechanics are under pressure to fix equipment quickly because breakdowns usually stop or slow production. In addition to making repairs, mechanics help install new machines. They may enter instructions for computer-controlled machinery and demonstrate the equipment to machine operators.

Plant workers who do not operate or maintain equipment mostly perform a variety of other material-moving tasks. Some

drive industrial trucks or tractors to move materials around the plant, load and unload trucks and railroad cars, or package products and materials by hand.

Engineers and engineering technicians, although a vital part of the textile industry, account for less than 1 percent of employment in the industry. Some engineers are *textile engineers*, who specialize in the design of textile machinery, the study of fibers, and textile production. The industry also employs other types of engineers, particularly *industrial* and *mechanical engineers*.

Training and Advancement

As the textile industry becomes increasingly automated, production workers need to be prepared. A high school diploma or GED may be necessary for many entry-level positions, and extensive postsecondary training is required for more technical jobs. This training may be obtained at technical schools and community colleges. More and more often, job applicants are screened through the use of tests, to ensure that they have the necessary skills.

Extensive on-the-job training has become an integral part of working in today's textile mills. Technical training is designed to help workers understand complex, automated machinery, recognize problems, and restart machinery when the problem is solved.

Installation, maintenance, and repair workers, such as industrial machinery mechanics, also require extensive training. Training may help experienced workers advance to more skilled jobs or even supervisory positions.

Increasingly, training is offered to enable people to work well in a team-oriented environment. Many firms have established training centers or hosted seminars that encourage employee self-direction and responsibility and the development of interpersonal skills. Because of the emphasis on teamwork and the small number of management levels in modern textile mills, firms place a premium on workers who show initiative and communicate effectively.

Engineering applicants generally need a bachelor's or advanced degree in a field of engineering or production management. Degrees in mechanical or industrial engineering are common, but concentrations in textile-specific areas of engineering are especially useful. For example, many applicants take classes in textile engineering, textile technology, textile materials, and design. These specialized programs usually are found in engineering and design schools in the South and Northeast. As in other industries, a technical degree with an advanced degree in business can lead to opportunities in management.

Earnings

Average weekly earnings of nonsupervisory textile production workers were \$477 in 2002, compared with \$619 for production workers in all manufacturing and \$506 for workers throughout private industry. Wages within the textile industry depend upon skill level and type of mill. Workers in textile goods manufacturing generally make more than those working in yarn and fabric mills. In addition to typical benefits, employees often are eligible for discounts in factory merchandise

Table 1. Employment of wage and salary workers in textile mill and products by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	489	100.0	-31.0
Management, business, and financial occupations	25	5.1	-29.7
Top executives	8	1.7	-27.4
Industrial production managers	5	1.0	-32.2
Professional and related occupations	10	2.1	-30.9
Sales and related occupations	9	1.9	-25.2
Sales representatives, wholesale and manufacturing, except technical and scientific products	6	1.2	-26.3
Office and administrative support occupations	47	9.6	-36.4
Bookkeeping, accounting, and auditing clerks	4	0.8	-37.0
Customer service representatives	3	0.7	-27.4
Production, planning, and expediting clerks	4	0.8	-30.8
Shipping, receiving, and traffic clerks	8	1.7	-35.6
Stock clerks and order fillers	4	0.9	-40.3
Office clerks, general	6	1.2	-34.4
Installation, maintenance, and repair occupations	31	6.4	-32.5
Industrial machinery mechanics	10	2.1	-32.7
Maintenance and repair workers, general	10	2.0	-32.7
Maintenance workers, machinery	4	0.9	-38.8
Production occupations	311	63.5	-30.1
First-line supervisors/managers of production and operating workers	19	3.9	-29.7
Team assemblers	13	2.8	-26.3
Printing machine operators	3	0.7	-43.1
Pressers, textile, garment, and related materials	4	0.7	-36.0
Sewing machine operators	54	11.0	-11.8
Textile machine setters, operators, and tenders	125	25.5	-37.5
Textile bleaching and dyeing machine operators and tenders	19	3.9	-43.1
Textile cutting machine setters, operators, and tenders	11	2.3	-32.3
Textile knitting and weaving machine setters, operators, and tenders	39	8.0	-39.1
Textile winding, twisting, and drawing out machine setters, operators, and tenders	55	11.3	-35.4
Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers	11	2.3	-33.4
All other textile, apparel, and furnishings workers	17	3.4	-31.1
Inspectors, testers, sorters, samplers, and weighers	19	3.9	-29.4
Helpers—Production workers	10	2.1	-38.3
Transportation and material moving occupations	49	9.9	-32.7
Industrial truck and tractor operators	9	1.9	-29.0
Laborers and freight, stock, and material movers, hand	15	3.0	-40.6
Machine feeders and offbearers	7	1.4	-37.3
Packers and packagers, hand	11	2.3	-23.8

NOTE: May not add to totals due to omission of occupations with small employment.

stores. Earnings in the largest occupations in textile mills and products industry appear in table 2.

Only 6.3 percent of textile workers were union members or were covered by a union contract in 2002, compared with 15 percent for the economy as a whole. The most prominent union in the industry is the Union of Needletrades, Industrial and Textile Employees (UNITE), which was formed in 1995 by the merger of the Amalgamated Clothing and Textile Workers Union and the International Ladies' Garment Workers Union.

Outlook

Wage and salary employment in the textile mills and products industry is expected to decline by about 31 percent through 2012, compared with an increase of 16 percent for all industries combined. Employment decreases will result from increasing worker productivity, an increase in imports, and the decline of the domestic apparel industry—a major buyer of textiles. Nevertheless, job openings will arise as experienced workers transfer to other industries, retire, or leave the workforce for other reasons.

Beginning in 2004, quotas will be lifted on apparel and textiles traded among our major trading partners. Although the agreements to lift quotas will open additional markets to textiles made in the United States, it is expected to result in a net increase in imports of textile products from countries with lower labor costs, particularly China. In addition, the overvalued dollar, unless it can be lowered, will continue to make imports cheaper relative to domestically produced products and will result in a rise in imports. Some textile companies have reacted to the rise in cheaper imports by closing small, inefficient plants or moving production to countries with lower costs. Other companies are consolidating, which further reduces employment.

Some segments of the textile industry, like industrial fabrics, carpets, and specialty yarns, are highly automated, innovative, and competitive on a global scale, so they will be able to

expand exports as a result of more open trade. Other sectors, such as fabric for apparel, will be negatively impacted, as a number of apparel manufacturers relocate production to other countries. On balance, textile mills are likely to lose employment as a result of this open trade because of its effect on the American apparel industry. The expected increase in apparel imports and the decline in apparel production will adversely affect demand for domestically produced textiles.

Another major reason for the projected decline in jobs in the textile industry is due to the increasing investment in technology by companies and the resulting increase in labor productivity. Wider looms, robotics, new methods for making textiles that do not require spinning or weaving, and the application of computers to various processes are resulting in fewer workers needed to produce the same amount of textile products. Companies are also continuing to open new, more modern plants, which use fewer workers, while closing inefficient ones. As this happens, overall demand for textile machine operators and material handlers will continue to decline, but improve for those who have the skills to operate the more high-tech machines.

Technology also has its bright side. The United States is leading the world in discovering new fibers and finding new uses for high-tech textiles. For example, biotechnology research is expected to lead to new sources of fibers, such as corn, and improvements in existing fibers. Some fibers currently being introduced have built-in memories of color and shape, and some have anti-bacterial qualities. These technologies and engineering advancements in textile production will be implemented at a growing rate in coming years. It is expected to result in the need for more highly skilled and technical workers, who will be working in an increasingly high-tech environment.

Sources of Additional Information

For additional information concerning career opportunities, technological advances, and legislative developments in the textile industry, contact:

- American Textile Manufacturing Institute, 1130 Connecticut Ave. NW., Suite 1200, Washington, DC 20036-3954. Internet: <http://www.atmi.org>
- Institute of Textile Technology, 2551 Ivy Rd., Charlottesville, VA 22903-4614. Internet: <http://www.itt.edu>

Information on the following occupations employed in the textile industry can be found in the 2004-05 edition of the *Occupational Outlook Handbook*.

- Engineers
- Engineering technicians
- Industrial machinery installation, maintenance, and repair workers
- Inspectors, testers, sorters, samplers, and weighers
- Machinists
- Material moving occupations
- Textile, apparel, and furnishings occupations

Table 2. Median hourly earnings of the largest occupations in textile mill and products, 2002

Occupation	Textile mills	Textile product mills	All industries
First-line supervisors/managers of production and operating workers	\$18.89	\$16.79	\$20.64
Industrial machinery mechanics	13.95	14.03	18.26
Maintenance and repair workers, general	13.71	13.65	14.12
Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers	12.26	11.90	13.22
Inspectors, testers, sorters, samplers, and weighers	10.52	9.98	13.01
Team assemblers	10.35	10.40	10.90
Textile winding, twisting, and drawing out machine setters, operators, and tenders	10.34	10.75	10.54
Textile bleaching and dyeing machine operators and tenders	10.33	10.44	10.00
Laborers and freight, stock, and material movers, hand	10.00	9.04	9.48
Sewing machine operators	9.09	8.61	8.39

Trade



SIGNIFICANT POINTS

- Most jobs in automobile dealers offer above-average earnings, but require only 2 years of postsecondary training or less.
- Automobile dealers are expected to decline in number but increase in size, as consolidation continues in the industry.
- Employment growth is expected to be average but sensitive to downturns in the economy.

Nature of the Industry

Automobile dealers are the bridge between automobile manufacturers and the U.S. consumer. *New car dealers* are primarily engaged in retailing new cars, sport utility vehicles, and passenger and cargo vans. New car dealers employ more than 9 out of 10 workers in the industry. Most new car dealers sell these new vehicles in combination with other activities, such as repair services, retailing used cars, and selling replacement parts and accessories. These dealer offer one-stop shopping for customers who wish to buy, finance, and service their next vehicle. On the other hand, stand-alone *used car dealers* specialize in used vehicle sales and account for only 1 out of 10 jobs in the industry.

Sales of new cars, trucks, and vans depend on changing consumer tastes, popularity of the manufacturers' vehicle models, and the intensity of competition with other dealers. The business cycle greatly affects automobile sales—when the economy of the Nation is declining, car buyers may postpone purchases of new vehicles and, conversely, when the economy is growing and consumers feel more financially secure, vehicle sales increase. Consumers are also highly sensitive to the cost of borrowing. Automotive dealers are more likely to offer generous incentives, rebates, and financing deals during slow periods in order to maintain high sales volumes and lean inventories.

According to the National Automobile Dealers Association, new vehicle sales account for over half of total franchised new-car and -truck dealer sales. These sales spawn additional revenue in other departments of new car dealers. By putting new vehicles on the road, dealers can count on aftermarket additions, new repair and service customers, and future used vehicle trade-ins.

The aftermarket sales department in new car dealers sells additional services and merchandise after the new vehicle salesperson has closed a deal. Aftermarket sales workers sell service contracts and insurance to new and used car buyers and arrange financing for their purchase. Representatives offer extended warranties and additional services, such as undercoat sealant and environmental paint protection packages, to increase the revenue generated for each vehicle sold.

Car and truck leasing arrangements are another financing option for consumers. Leasing services have grown in recent years to accommodate changing consumer purchasing habits. As vehicles have become more costly, growing numbers of consumers are unable or reluctant to make the long-term investment entailed

in the purchase of a new car or truck. Leasing provides an alternative to high initial investment costs while typically yielding lower monthly payments.

Service departments in automobile dealers provide automotive repair services and sell accessories and replacement parts. Most service only cars and small trucks, but a small number service large trucks, buses, and tractor-trailers. Some dealers also have body shops to do collision repair, refinishing, and painting. The work of the service department has a major influence on customers' satisfaction and willingness to purchase future vehicles from the dealer.

The used car sales department of new car dealers sells trade-ins and former rental and leased cars, trucks, and vans. Because new car prices continue to increase faster than used car prices, used cars have become more popular among customers. Also, innovative technology has increased the durability and longevity of new cars, resulting in higher quality used cars. In recent years, the sale of used cars has become a major source of profits for many new car dealers in the wake of decreasing margins for new cars. In fact, some luxury vehicle manufacturers promote "certified pre-owned" vehicles to customers who may be unable to afford new vehicles of a particular make. In economic downturns, the demand for these and other used cars often increases as sales of new cars decline.

Stand-alone used car dealers range from small, one-location stores to large, nationwide superstores, which have increased in popularity over the last decade. Like the used car departments of new car dealers, they also capitalize on increased demand for used cars and relatively large profits on sales of previously owned cars, trucks, and vans. Some of the larger stores offer low-hassle sales on large inventories of these popular vehicles. Such dealers typically contract out warranty and other service-related work to other dealers or to satellite service facilities. Growth in leasing agreements and rental companies will continue to provide quality vehicles to these dealers, thus providing for future employment growth in the used car market.

Automobile dealers increasingly use the Internet to market new and used cars. Through websites, consumers can easily access vehicle reviews, and compare models, features, and prices. Many web sites also allow consumers to research insurance, financing, leasing, and warranty options. This results in a more informed consumer and may decrease the amount of face time needed with salespersons.

Working Conditions

Employees in automobile dealers work longer hours than do those in most other industries. About 85 percent of automobile dealer employees worked full time in 2002, and about 40 percent worked more than 40 hours a week. To satisfy customer service needs, many dealers provide evening and weekend service. The 5-day, 40-hour week usually is the exception, rather than the rule, in this industry.

Most automobile salespersons and administrative workers spend their time in dealer showrooms; individual offices are a rarity. Multiple users share limited office space that may be cramped and sparsely equipped. The competitive nature of selling is stressful to automotive salespersons, as they try to meet company sales quotas and personal earnings goals. Compared with that for all occupations in general, the proportion of workers who transfer from automotive sales jobs to other occupations is relatively high.

Service technicians and automotive body repairers generally work indoors in well-ventilated and well-lighted repair shops. However, some shops are drafty and noisy. Technicians and repairers frequently work with dirty and greasy parts, and in awkward positions. They often lift heavy parts and tools. Minor cuts, burns, and bruises are common, but serious accidents are avoided when the shop is kept clean and orderly and safety practices are observed. Despite hazards, precautions taken by dealers to avoid and prevent injuries have kept the workplace relatively safe. In 2002, there were 5.5 cases of work-related injuries and illnesses per 100 full-time workers in the new and used car dealers industry, close to the national average of 5.3 cases. Separately, used car dealers reported only 2.6 cases of work-related injuries and illnesses per 100 full-time workers—well below the national average.

Employment

Automobile dealers provided about 1.2 million wage and salary jobs in 2002. An additional 55,000 self-employed persons worked in this industry. Sales, installation, maintenance, and repair workers shared two-thirds of wage and salary employment. The remaining third primarily were management, administrative support, transportation, and material-moving positions.

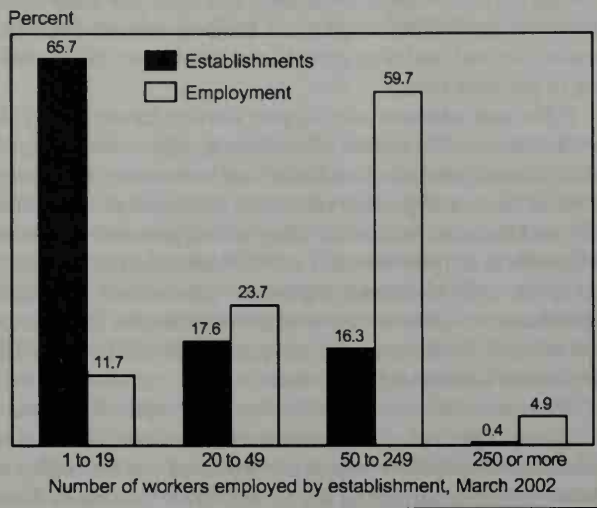
Since 1950, the trend in this industry has been toward consolidation. Franchised dealers have decreased in number while their sales volume has increased. Larger dealers can offer more services, typically at lower costs to the dealer and the customer. Over half of jobs in automobile dealers were in establishments employing between 50 and 249 workers (chart). On average, automobile dealers had nearly 25 employees per establishment, compared with an average of about 14 employees in all retail businesses.

Occupations in the Industry

The number of workers employed by automobile dealers varies significantly depending on dealer size, location, makes of vehicles handled, and distribution of sales among departments. Table 1 indicates that the majority of workers in this industry were in sales, repair, and administrative support occupations.

Sales and related occupations are among the most important occupations in automobile dealers. Their success in selling ve-

More than half of the jobs in automobile dealers are in establishments employing between 50 and 249 workers



hicles and services determines the success of the dealer. *Automotive retail salespersons* usually are the first to greet customers and determine their interests through a series of questions. Before entering the dealer, many customers use the Internet to research and compare vehicle prices, features, and options. Salespersons then explain and demonstrate the vehicle's features in the showroom and on the road. Working closely with automotive *sales worker supervisors* and their customers, they negotiate the final terms and price of the sale. Automotive salespersons must be tactful, well-groomed, and able to express themselves well. Their success in sales depends upon their ability to win the respect and trust of prospective customers.

Installation, maintenance, and repair occupations are another integral part of automobile dealers. *Automotive service technicians and mechanics* service, diagnose, adjust, and repair automobiles and light trucks with gasoline engines, such as vans and pickups. *Automotive body and related repairers* repair and finish vehicle bodies, straighten bent body parts, remove dents, and replace crumpled parts that are beyond repair. *Shop managers* usually are among the most experienced service technicians. They supervise and train other technicians to make sure that service work is performed properly. *Service managers* oversee the entire service department and are responsible for the department's reputation, efficiency, and profitability. Increasingly, service departments use computers to increase productivity and improve service workflow by scheduling customer appointments, troubleshooting technical problems, and locating service information and parts.

Service advisors handle the administrative and customer relations part of the service department. They greet customers, listen to their description of problems or service desired, write repair orders, and estimate the cost and time needed to do the repair. They also handle customer complaints, contact customers when technicians discover new problems while doing the work, and explain to customers the work performed and the charges associated with the repairs.

In support of the service and repair department, *parts salespersons* supply vehicle parts to technicians and repairers. They also sell replacement parts and accessories to the public. *Parts managers* run the parts department and keep the automotive parts inventory. They display and promote sales of parts and accessories and deal with garages and other repair shops seeking to purchase parts.

Office and administrative support workers handle the paperwork of automobile dealers. *Bookkeeping, accounting, and auditing clerks; general office clerks; and secretaries and administrative assistants* prepare reports on daily operations, inventory, and accounts receivable. They gather, process, and record information; and perform other administrative support and clerical duties. *Office managers* organize, supervise, and coordinate administrative operations. Many office managers also are responsible for collecting and analyzing information on each department's financial performance.

Transportation and material-moving occupations account for about 11 percent of jobs in automobile dealers. *Cleaners of vehicles and equipment* prepare new and used cars for display in the showroom or parking lot and for delivery to customers. They may wash and wax vehicles by hand and perform simple services such as changing a tire or battery. *Truckdrivers* operate light delivery trucks to pick up and deliver automotive parts. Some drive tow trucks that bring damaged vehicles to the dealer for repair.

Management jobs often are filled by promoting workers with years of related experience. For example, most *sales managers* start as automotive salespersons. *Sales managers* hire, train, and supervise the dealer's sales force. They are the lead negotiators in all transactions between sales workers and customers. Most advance to their positions after success as salespersons. They review market analyses to determine consumer needs, estimate volume potential for various models, and develop sales campaigns.

General and operations managers are in charge of all dealer operations. They need extensive business and management skills, usually acquired through experience as a manager in one or more of the dealer departments. Dealer performance and profitability ultimately are up to them. General managers sometimes have an ownership interest in the dealer.

Training and Advancement

Requirements for many jobs vary from dealer to dealer. To find out exactly how to qualify for a specific job, ask the dealer or manager in charge. A substantial number of jobs require no postsecondary education—more than half of all workers in the industry have no formal education beyond high school. In today's competitive job market, however, nearly all dealers demand a high school diploma. Courses in automotive technology are important for service jobs, as well as a basic background in business, electronics, mathematics, computers, and science. Sales workers require strong communication skills to deal with the public because they represent the dealer.

Most new salespersons receive extensive on-the-job training, beginning with mentoring from sales managers and experienced sales workers. In large dealers, beginners receive several days of classroom training to learn the models for sale, methods

for approaching prospective customers, negotiation techniques, and ways to close sales. Some manufacturers furnish training manuals and other informational materials for sales workers. Managers continually guide and train sales workers, both on the job and at periodic sales meetings.

Table 1. Employment of wage and salary workers in automobile dealers by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,250	100.0	12.6
Management, business, and financial occupations	101	8.1	24.4
General and operations managers	31	2.5	20.6
Sales managers	22	1.8	34.5
Financial managers	19	0.8	24.0
Service occupations	18	1.4	17.2
Janitors and cleaners, except maids and housekeeping cleaners	12	1.0	17.8
Sales and related occupations	448	35.9	12.4
First-line supervisors/managers of retail sales workers	51	4.1	17.2
Cashiers, except gaming	21	1.7	15.3
Counter and rental clerks	27	2.2	24.0
Parts salespersons	66	5.3	-0.8
Retail salespersons	266	21.2	12.6
Office and administrative support occupations	198	15.8	7.4
First-line supervisors/managers of office and administrative support workers	17	1.4	5.4
Bill and account collectors	7	0.5	23.4
Billing and posting clerks and machine operators	10	0.8	11.6
Bookkeeping, accounting, and auditing clerks	36	2.8	5.4
Customer service representatives	11	0.9	24.0
Receptionists and information clerks	11	0.9	24.0
Secretaries and administrative assistants	14	1.1	0.1
Office clerks, general	39	3.1	8.0
Installation, maintenance, and repair occupations	339	27.1	12.9
First-line supervisors/managers of mechanics, installers, and repairers	32	2.6	14.9
Automotive body and related repairers	47	3.7	11.6
Automotive service technicians and mechanics	227	18.2	11.6
Bus and truck mechanics and diesel engine specialists	9	0.7	19.3
Helpers—Installation, maintenance, and repair workers	13	1.1	24.0
Transportation and material moving occupations	137	11.0	10.1
Truck drivers, light or delivery services	19	1.5	14.9
All other motor vehicle operators	10	0.8	24.0
Cleaners of vehicles and equipment	76	6.1	7.1
Laborers and freight, stock, and material movers, hand	11	0.9	1.9

NOTE: May not add to totals due to omission of occupations with small employment.

Some service technicians and repairers may begin as apprentices or trainees, helpers, or lubrication workers. They work under close supervision of experienced technicians, repairers, and service managers. Even though beginners may be able to perform routine service tasks and make simple repairs after a few months on the job, they usually need 1 to 2 years of experience to acquire enough skills to become a certified service technician.

Automotive technology is rapidly increasing in sophistication, and dealers prefer to hire graduates of postsecondary automotive training programs for trainee positions. Graduates of such programs often earn promotion to the journey level after only a few months on the job. Most community and junior colleges and vocational and technical schools offer postsecondary automotive training programs leading to an associate degree in automotive technology or auto body repair. They generally provide intense career preparation through a combination of classroom instruction and hands-on practice. Good reading and basic math skills also are required to study technical manuals, keep abreast of new technology, and learn new service and repair techniques.

Various automotive manufacturers and their participating dealers sponsor 2-year associate degree programs at postsecondary schools across the Nation. Students in these programs typically spend alternate 10- to 12-week periods attending classes full time and working full time in the service departments of sponsoring dealers. Dealers increasingly send experienced technicians to factory training centers to receive special training in the repair of components, such as electronic fuel injection or air-conditioning. Factory representatives also visit many shops to conduct short training sessions.

Workers need years of experience in sales, service, or administration to advance to management positions in dealers. Employers increasingly prefer persons with 4-year college degrees in business administration and marketing, particularly in dealers that are larger, more competitive, and more efficient. Some motor vehicle manufacturers offer management training classes and seminars.

Earnings

Average weekly earnings of nonsupervisory workers in automobile dealers were \$619 in 2002, substantially higher than the average for retail trade (\$361), as well as that for all private industry (\$506). Earnings vary depending on occupation, experience, and the dealer's geographic location and size. Earnings in selected occupations in automobile dealers appear in table 2.

Most automobile sales workers are paid on a commission-only basis. Commission systems vary, but dealers often guarantee new salespersons a modest salary for the first few months until they learn how to sell vehicles. Many dealers also pay experienced, commissioned sales workers a modest weekly or monthly salary to compensate for the unstable nature of sales. Dealers, especially larger ones, also pay bonuses and have special incentive programs for exceeding sales quotas. With increasing customer service requirements, some dealers and manufacturers have adopted a noncommissioned sales force paid entirely by salary.

Most automotive service technicians and mechanics receive a commission related to the labor cost charged to the customer.

Their earnings depend on the amount of work available and completed.

In 2002, relatively few workers in automobile dealers, less than 4 percent, were union members or were covered by union contracts, compared with about 15 percent of workers in all industries.

Outlook

Wage and salary jobs in automobile dealers are projected to increase 13 percent over the 2002-12 period, compared with projected growth of about 16 percent for all industries combined. Growth in automobile dealers strongly reflects consumer confidence and purchasing habits. The structure of dealers, the strength of the Nation's economy, and trends in consumer preferences will influence the employment outlook for this industry.

Over the 2002-12 period, population growth will increase demand for passenger cars and employment in automobile dealers. Growth of the labor force and in the number of families in which both spouses need vehicles to commute to work will contribute to increased vehicle sales and employment in this industry. As personal incomes continue to grow, greater numbers of persons will be able to afford the luxury of owning multiple vehicles, which also should increase sales. However, the penchant for the public to keep vehicles for many more years than in the past may have a dampening effect on motor vehicle sales. New and used car dealers may also face increasing competition from online electronic auctions that facilitate consumer-to-consumer and business-to-consumer trade in new and used goods, including vehicles.

The trend towards dealer consolidation should have a minimal effect on the industry because of continued demand for vehicles and related services. Dealers will always need well-qualified people to work in the various departments of the dealer. In an effort to achieve greater financial and operational efficiency and flexibility, greater emphasis will be placed on aftermarket services, such as financing and vehicle service and repair.

Growth in leasing agreements and rental companies will continue to provide quality vehicles to the used car market, thus providing for future employment growth. Some large used car

Table 2. Median hourly earnings of the largest occupations in automobile dealers, 2002

Occupation	Automobile dealers	All industries
General and operations managers	\$42.84	\$32.80
First-line supervisors/managers of retail sales workers	29.96	14.28
First-line supervisors/managers of mechanics, installers, and repairers	23.48	22.87
Retail salespersons	18.25	8.51
Automotive service technicians and mechanics	17.66	14.71
Automotive body and related repairers	16.96	15.71
Parts salespersons	14.41	11.51
Bookkeeping, accounting, and auditing clerks	12.20	13.16
Office clerks, general	10.16	10.71
Cleaners of vehicles and equipment	8.61	8.20

dealers offer low-hassle sales on large inventories of popular vehicles. Such dealers typically contract out warranty and other service-related work to other dealers or to satellite service facilities, reducing the demand for workers in these departments.

The need to replace workers who retire or transfer to other occupations will result in many job openings for sales workers in automobile dealers. In addition, as consumers' expectations and demands continue to increase, dealers will seek more highly educated salespersons. Persons who have a college degree and previous sales experience should have the best opportunities. If alternative sales techniques and compensation systems, such as using salaried noncommissioned sales professionals, become more common, the greater income stability may lead to less turnover of sales jobs.

Opportunities in the service and repair sectors of this industry should be plentiful, especially for persons who complete formal automotive service technician training. The growing complexity of automotive technology increasingly requires highly trained service technicians to service vehicles. Most persons who enter service and repair occupations may expect steady work because changes in economic conditions have little effect on this part of the dealer's business.

Opportunities in management occupations will be best for persons with college degrees and those with considerable industry experience. However, consolidation of dealers will slow

the growth of managerial jobs. Competition for managerial positions will remain relatively keen.

Sources of Additional Information

For more information about work opportunities, contact local automobile dealers or the local offices of the State employment service. The latter also may have information about training programs.

For additional information about careers and training in the automobile dealers industry, write to:

- National Automobile Dealers Association, 8400 Westpark Dr., McLean, VA 22102.
Internet: <http://www.nada.org>

More information on the following occupations may be found in the 2004-05 edition of the *Occupational Outlook Handbook*:

- Advertising, marketing, promotions, public relations, and sales managers
- Automotive body and related repairers
- Automotive service technicians and mechanics
- Retail salespersons
- Sales worker supervisors

Clothing, Accessory, and General Merchandise Stores

(NAICS 448 and 452)

SIGNIFICANT POINTS

- Sales and administrative support jobs comprise 83 percent of industry employment.
- Most jobs do not require formal education; many people get their first jobs in this industry.
- Clothing, accessory, and general merchandise stores offer many part-time jobs with relatively low earnings.
- Despite relatively slow employment growth, turnover will produce numerous job openings in this large industry.

Nature of the Industry

Clothing, accessory, and general merchandise stores are some of the most visited establishments in the country. Whether shopping for an item of clothing or piece of jewelry, a household appliance, or even food, you will likely go to one of these stores to either make your purchase or compare selections with other retail outlets. General merchandise stores, in particular, sell a wide variety of items in their stores. This category is comprised of department stores, including discount department stores, as well as super centers and warehouse club stores. It also includes dollar stores that sell a wide variety of merchandise very inexpensively.

Department stores sell a wide selection of merchandise with no one line predominating. These stores generally are arranged into departments with a manager heading each department. These departments can sell apparel, furniture, appliances, home furnishings, cosmetics, jewelry, paint and hardware, electronics, and sporting goods. They may also sell services such as optical, photography, and pharmacy. Discount department stores typically have fewer sales workers, relying more on self-service features, and have centrally located cashiers. Department stores that sell bulk items, like major appliances, usually provide delivery and installation services. Upscale department stores may offer tailoring for their clothing lines and more personal service.

Warehouse club stores and super centers, the fastest growing segment of this industry, sell an even more eclectic mix of products and services in fixed quantities at low prices. These stores typically include an assortment of food items, often sold in bulk, along with an array of household and automotive goods, clothing, and services that may vary over time. These stores often require that shoppers purchase a membership in the store that entitles them to shop there. They offer very little service and usually require the customer to take home the item.

Clothing and accessory stores sell a much narrower group of items that include apparel for all members of the family, as well as shoes, luggage, leather goods, lingerie, jewelry, uniforms, and bridal gowns. Stores in this sector may sell all of the above items or concentrate on a few. They often are staffed with knowledgeable salespersons who can help in the selection of sizes, styles, and accessories. Many of these stores are lo-

cated in shopping malls across the country and have significantly fewer workers than department stores.

Working Conditions

Most employees in clothing, accessory, and general merchandise stores work under clean, well-lighted conditions. Many jobs are part time, with the most employees working during peak selling times, including nights, weekends, and holidays. Because weekends are busy days in retailing, almost all employees work at least one of these days and have a weekday off. During busy periods, such as holidays and back-to-school season, longer than normal hours may be scheduled, and vacation time is limited for most workers, including buyers and managers.

Retail salespersons and cashiers often stand for long periods, and stock clerks may perform strenuous tasks such as moving heavy, cumbersome boxes.

The incidence of work-related illnesses and injuries varies greatly among segments of the industry. In 2002, workers in clothing and accessory stores had 3.0 cases of injury and illness per 100 full-time workers, while those in general merchandise stores had 7.7 cases per 100 full-time workers. This compares with an average of 5.3 throughout private industry.

Employment

Clothing, accessory, and general merchandise stores—one of the largest employers in the Nation—had about 4.1 million wage and salary jobs in 2002. Department stores accounted for most jobs in the industry, but only about 7 percent of establishments. In 2002, about 7 of 10 workers were employed in clothing, accessory, and general merchandise stores with more than 50 workers (see chart). In contrast to many industries, this industry employs workers in all sections of the country, from the largest cities to the smallest towns.

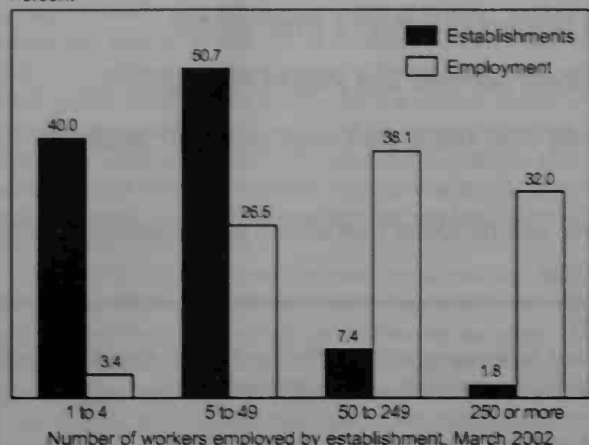
Many of the industry's workers are young—31 percent were under 24 years old in 2002, compared with 14 percent for all industries. About 29 percent of the workers were employed part time.

Occupations in the Industry

Sales and related occupations accounted for 65 percent of workers in this industry in 2002 (table 1). *Retail salespersons*, who

Fewer than 10 percent of clothing, accessory, and general merchandise stores employ more than 50 workers, but they have 70 percent of the jobs in the industry

Percent



comprise 56 percent of employment in the industry, help customers select and purchase merchandise. A salesperson's primary job is to interest customers in the merchandise and to answer any questions customers may have. In order to do this, the worker may describe the product's various models, styles, and colors, or demonstrate its use. To sell expensive and complex items, workers need extensive knowledge of the products.

In addition to selling, most retail salespersons electronically register the sale on a cash register or terminal; receive cash, checks, and charge payments; and give change and receipts. Depending on the hours they work, they may open or close their cash registers or terminals. This may include counting the money in the cash register; separating charge slips, coupons, and exchange vouchers; and making deposits at the cash office. Salespersons are held responsible for the contents of their register, and repeated shortages are often a cause for dismissal.

Salespersons may be responsible for handling returns and exchanges of merchandise, wrapping gifts, and keeping their work areas neat. In addition, they may help stock shelves or racks, arrange for mailing or delivery of a purchase, mark price tags, take inventory, and prepare displays. They also must be familiar with the store's security practices to help prevent theft of merchandise. *Cashiers* total bills, receive money, make change, fill out charge forms, and give receipts. Retail salespersons and cashiers often have similar duties.

Office and administrative support occupations make up the next largest group of employees, accounting for 18 percent of total employment in the industry. *Stock clerks and order fillers* bring merchandise to the sales floor and stock shelves and racks. They may also mark items with identifying codes or prices so that they can be recognized quickly and easily, although many items today arrive preticketed. *Customer service representatives* investigate and resolve customers' complaints about merchandise, service, billing, or credit ratings. The industry also employs administrative occupations found in most industries, such as general office clerks and bookkeepers.

Management and business and financial operations occupations accounted for 3 percent of industry employment. (Only managers located at the individual stores are counted in this industry. Higher level managers for national or regional chain stores with multiple locations are typically employed at headquarters establishments, which are classified in the management of companies and enterprises industry. This industry is not covered in the *Career Guide*.) *Department managers* oversee sales workers in a department or section of the store. They set the work schedule, supervise employee performance, and are responsible for the overall sales and profitability of their departments. They may also be called upon to settle a dispute between a customer and salesperson.

Buyers purchase merchandise for resale from wholesalers or manufacturers. Using historical records, market analysis, and their sense of consumer demand, they buy merchandise, keeping in mind their customer's demand for style, quality, and low price. Wrong decisions mean that the store will mark down slow-selling merchandise, thus losing profits. Buyers for larger stores or chains usually buy one classification of merchandise, such as casual menswear or home furnishings; those working for smaller stores may buy all the merchandise sold in the store. They also plan and implement sales promotion plans for their merchandise, such as arranging for advertising and ensuring that the merchandise is displayed properly.

Merchandise managers are in charge of a group of buyers and department managers; they plan and supervise the purchase and marketing of merchandise in a broad area, such as women's apparel or appliances. In department store chains, with numerous stores, many of the buying and merchandising functions are centralized in one location. Some local managers might decide which merchandise, among that bought centrally, would be best for their own stores.

Department store managers direct and coordinate the activities in these stores. They may set pricing policies to maintain profitability and notify senior management of concerns or problems. Department store managers usually supervise department managers directly, and indirectly oversee other department store workers.

Because they may be the only managers in smaller stores, *clothing and accessory store managers* combine many of the duties of department managers, department store managers, and buyers. *Retail chain store area managers* or *district managers* oversee the activities of clothing and accessory store managers in an area. They hire managers, ensure that company policies are carried out, and coordinate sales and promotional activities.

Various other store-level occupations in this diversified industry include pharmacists, hairdressers, material moving workers, food preparation and serving workers, and security guards.

Training and Advancement

There are no formal educational requirements for most sales and administrative support jobs; in fact, many people get their first jobs in this industry. A high school education is preferred, especially by larger employers. Because many of the new workers in this industry are recent immigrants, employers may re-

Table 1. Employment of wage and salary workers in clothing, accessory, and general merchandise stores by occupation, 2002 and projected change, 2002-12.
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	4,129	100.0	8.3
Management, business, and financial occupations	122	3.0	13.1
Top executives	63	1.5	9.8
Marketing and sales managers	8	0.2	21.9
Wholesale and retail buyers, except farm products	11	0.3	-2.4
Professional and related occupations	76	1.8	43.4
Merchandise displayers and window trimmers	11	0.3	17.2
Pharmacists	26	0.6	68.0
Pharmacy technicians	19	0.5	55.4
Opticians, dispensing	8	0.2	16.3
Service occupations	191	4.6	14.8
Private detectives and investigators	10	0.2	9.1
Security guards	28	0.7	10.0
Food preparation workers	9	0.2	12.5
Combined food preparation and serving workers, including fast food	21	0.5	21.7
Janitors and cleaners, except maids and housekeeping cleaners	43	1.1	12.4
Locker room, coatroom, and dressing room attendants	9	0.2	20.7
Hairdressers, hairstylists, and cosmetologists	19	0.5	11.4
Sales and related occupations	2,683	65.0	10.0
First-line supervisors/managers of retail sales workers	311	7.5	10.6
Cashiers, except gaming	581	14.1	11.4
Counter and rental clerks	17	0.4	21.9
Retail salespersons	1,697	41.1	9.1
Demonstrators and product promoters	16	0.4	16.6
All other sales and related workers	41	1.0	20.6
Office and administrative support occupations	752	18.2	-1.2
First-line supervisors/managers of office and administrative support workers	55	1.3	7.0
Bookkeeping, accounting, and auditing clerks	21	0.5	-5.7
Customer service representatives	61	1.5	18.9
Shipping, receiving, and traffic clerks	82	2.0	0.4
Stock clerks and order fillers	392	9.5	-6.7
Office clerks, general	31	0.7	1.9
Installation, maintenance, and repair occupations	43	1.0	6.5
Automotive service technicians and mechanics	16	0.4	-0.9
Production occupations	102	2.5	4.9
Tailors, dressmakers, and custom sewers	15	0.4	-4.9
Photographic processing machine operators	15	0.4	4.8
Transportation and material moving occupations	160	3.9	-0.7
Laborers and freight, stock, and material movers, hand	118	2.9	-3.5
Packers and packagers, hand	25	0.6	5.1

NOTE: May not add to totals due to omission of occupations with small employment.

quire English proficiency and may even offer language training to employees.

Salespersons should enjoy working with people. Among other desirable characteristics are a pleasant personality, a neat appearance, and the ability to communicate clearly. Because of the trend toward providing more service, it is becoming increasingly important for salespersons to be knowledgeable about the products and merchandise available. Some employers may conduct a background check of applicants—especially of those seeking work selling high-priced items.

In most small stores, an experienced employee or the manager instructs newly hired sales personnel on making out sales checks and operating the cash register. In larger stores, training programs are more formal and usually are conducted over several days. Some stores conduct periodic training seminars to refresh and improve the customer service and selling skills of their sales workers. Initially, trainees are taught how to make cash, check, and charge sales and eventually are instructed on returns and special orders. Other topics usually covered are customer service, security, and store policies and procedures. Depending on the type of product they are selling, sales workers may be given specialized training in their area. For example, those working in cosmetic sales receive instruction on the types of products available and the types of customers for whom these would be most beneficial.

Some salespersons are hired for a particular department, and others are placed after they have completed training. Placement usually is based on where positions are available. There are some salespersons, often called "floaters," who are not assigned to a particular department; instead, they work where needed.

Advancement opportunities for salespersons vary. As those who work full time gain experience and seniority, they usually move to positions of greater responsibility or to positions with potentially higher commissions. Salespersons who are paid on a commission basis—that is, they earn a percentage of the value of what they sell—may advance to selling more expensive items. The most experienced, and highest paid, salespersons sell big-ticket items. This work requires the most knowledge of the product and the greatest talent for persuasion. In some establishments, advancement opportunities are limited because one person, often the owner, is the only manager, but sales experience may be useful in finding a higher level job elsewhere. Retail selling experience is an asset when one is applying for sales positions with larger retailers or in other kinds of sales, such as motor vehicles, financial services, or wholesale merchandise.

Traditionally, capable salespersons with good leadership skills, yet without a college degree, could advance to management positions; however, a college education is becoming increasingly important for managerial positions such as department manager, store manager, or buyer. Computer skills are extremely important in all parts of the industry, especially in areas such as inventory control, human resources, sales forecasting, and electronic commerce. Many retailers prefer to hire persons with associate or bachelor's degrees in marketing, merchandising, or business as management trainees or assistant managers. Despite this trend, capable employees without a

college degree may still be able to advance to administrative or supervisory work.

Earnings

Hourly earnings of nonsupervisory workers in, clothing, accessory, and general merchandise stores are well below the average for all workers in private industry. This reflects both the high proportion of part-time and less experienced workers in these stores, and the fact that even experienced workers receive relatively low pay compared with experienced workers in many other industries (table 2). Earnings in selected occupations in clothing, accessory, and general merchandise stores appear in table 3.

Many employers permit workers to buy merchandise at a discount. Smaller stores usually offer limited employee benefits. In larger stores, benefits are more comparable with those offered by employers in other industries and can include vacation and sick leave, health and life insurance, profit sharing, and pension plans.

Unionization in this industry is limited. Only about 3 percent of workers were union members or covered by union contracts, compared with 15 percent in all industries.

Outlook

Numerous job openings will result from turnover in this large industry. Jobs will be available for young workers, first-time job seekers, persons with limited job experience, senior citizens, and people seeking part-time work, such as those with young children or those who wish to supplement their income from other jobs. Persons with a college degree or computer skills will be sought for managerial positions.

Overall, the number of wage and salary jobs in clothing, accessory, and general merchandise stores is expected to increase 8 percent over the 2002-12 period, compared to the 15 percent increase projected for all industries combined. The relatively slow growth is due mainly to limited job growth in clothing and

Table 2. Average earnings of nonsupervisory workers in Clothing, accessory, and general merchandise stores, 2002.

Industry segment	Weekly	Hourly
Total, private industry	\$506	\$14.95
Total, general merchandise stores	285	9.88
Warehouse clubs and supercenters	309	9.54
Other general merchandise stores	293	9.44
Discount department stores	289	9.42
Department stores	280	10.20
Total, clothing and clothing accessory stores	261	10.40
Men's clothing stores	325	11.66
Family clothing stores	256	10.27
Shoe stores	224	9.19
Women's clothing stores	214	10.22

Table 3. Median hourly earnings of the largest occupations in clothing, accessory, and general merchandise stores, 2002

Occupation	General merchandise Stores	Apparel and accessory stores	All industries
General and operations managers	\$22.15	\$22.11	\$32.80
First-line supervisors/managers of retail sales workers	12.71	13.66	14.28
Bookkeeping, accounting, and auditing clerks	11.68	10.94	13.16
Office clerks, general	10.46	9.86	10.71
Shipping, receiving, and traffic clerks	8.68	9.09	11.26
Stock clerks and order fillers	8.34	8.10	9.26
Retail salespersons	8.04	7.84	8.51
Counter and rental clerks	7.80	8.24	8.31
Cashiers	7.41	7.40	7.41
Packers and packagers, hand	7.19	7.28	8.03

accessory stores, as discount department stores and super centers account for a greater share of apparel sales. Also bringing down employment growth is the popularity of super centers and warehouse stores that stress self-service and are less labor intensive than the traditional retailers. Employment in full-service department stores will grow the slowest, as more people buy from discounters.

There will continue to be keen competition among retailers; new stores will continually open, and others will close. Alternative retail outlets—such as mail-order companies, home shopping, and the Internet—have taken some customers away from traditional retail stores, but not as much as originally expected. Studies show that most customers use the Internet to research items and compare prices, but go to the store to make their purchases. Although online sales are expected to grow rapidly, sales at traditional “brick and mortar” stores probably will remain a major portion of total retail sales. Although electronic commerce is expected to limit growth of some retail jobs, it is increasing opportunities for Internet sales managers, webmasters, technical support workers, and other related workers as many establishments begin to offer their goods online as well as in stores.

Some companies are moving towards obtaining goods directly from the manufacturer, bypassing the wholesale level completely, reducing costs, and increasing profits. This trend may further limit job growth in this industry, particularly among administrative and managerial workers. Many of these stores, particularly clothing and accessory stores, are also highly sensitive to the changing tastes of consumers and to the economy. Guessing wrong on upcoming trends, especially several years in a row, or being unable to weather a recession can cause even large, well-established stores to go bankrupt or out of business.

Worker productivity is increasing because of technological advances, particularly among clerks, managers, and buyers. For

example, computerized systems allow companies to streamline purchasing and obtain customer information and preferences, reducing the need for buyers. However, because direct customer contact also will remain important, employment of sales workers who interact personally with customers will be less affected by technological advances.

Sources of Additional Information

General information on careers in retail establishments is available from:

- National Retail Federation, 325 7th St. NW., Suite 1100, Washington, DC 20004.
- International Council of Shopping Centers, 665 5th Ave., New York, NY 10022. Internet: <http://www.icsc.org>

Information on many occupations employed in clothing, accessory, and general merchandise stores, including the following, appears in the 2004-05 *Occupational Outlook Handbook*:

- Advertising, marketing, promotions, public relations, and sales managers
- Cashiers
- Customer service representatives
- Designers
- Purchasing managers, buyers, and purchasing agents
- Retail salespersons
- Sales worker supervisors
- Security guards and gaming surveillance officers
- Stock clerks and order fillers

Grocery Stores

(NAICS 4451)

SIGNIFICANT POINTS

- Numerous job openings—many of them part time and relatively low paying—should be available due to the industry's large size and high rate of turnover.
- Many grocery store workers are young, with persons 16 to 24 years old holding 30 percent of the jobs.
- Cashiers and stock clerks and order fillers account for nearly one-half of all jobs.
- College graduates will fill most new management positions.

Nature of the Industry

Grocery stores, also known as supermarkets, are familiar to everyone. They sell an array of fresh and preserved foods, primarily for preparation and consumption at home. They also often sell prepared food, such as hot entrees or salads, for takeout meals. Stores range in size from supermarkets, which may employ hundreds of workers and sell numerous food and nonfood items, to convenience stores with small staffs and limited selections. However, convenience stores often sell fuel, including gasoline, diesel fuel, kerosene, and propane. Recently, many convenience stores have expanded their scope of services by providing automatic teller machines, money orders, and a more comprehensive selection of food and nonfood products. (Specialty grocery stores—meat and fish markets; fruit and vegetables markets; candy, nut, and confectionery stores; dairy products stores; retail bakeries; and health and dietetic food stores, for example—are not covered in this section. Also excluded are food services and drinking places that sell food and beverages for consumption on the premises. The latter are discussed elsewhere in the *Career Guide*.)

Grocery stores are found everywhere, although the size of the establishment and the range of goods and services offered vary. Traditionally, inner-city stores are small and offer a limited selection, although larger stores are now being built in many urban areas; suburban stores tend to be large supermarkets with a more diverse stock. Many supermarkets include several specialty departments that offer the products and services of seafood stores, bakeries, delicatessens, pharmacies, or florist shops. Household goods, health and beauty care items, automotive supplies, pet products, greeting cards, and clothing also are among the growing range of nonfood items sold. Some of the largest supermarkets even house cafeterias or food courts, and a few feature convenience stores. In addition, grocery stores may offer basic banking services and automatic teller machines, postal services, onsite film processing, drycleaning, video rentals, and catering services.

Working Conditions

Working conditions in most grocery stores are pleasant, with clean, well-lighted, climate-controlled surroundings. Work can be hectic, and dealing with customers can be stressful.

Grocery stores are open more hours and days than most work establishments, so workers are needed for early morning, late night, weekend, and holiday work. With employees working 30 hours a week, on average, these jobs are particularly attractive to workers who have family or school responsibilities or another job.

Most grocery store workers wear some sort of clothing, such as a jacket or apron, that identifies them as store employees and keeps their personal clothing clean. Health and safety regulations require some workers, such as those who work in the delicatessen or meat department, to wear head coverings, safety glasses, or gloves.

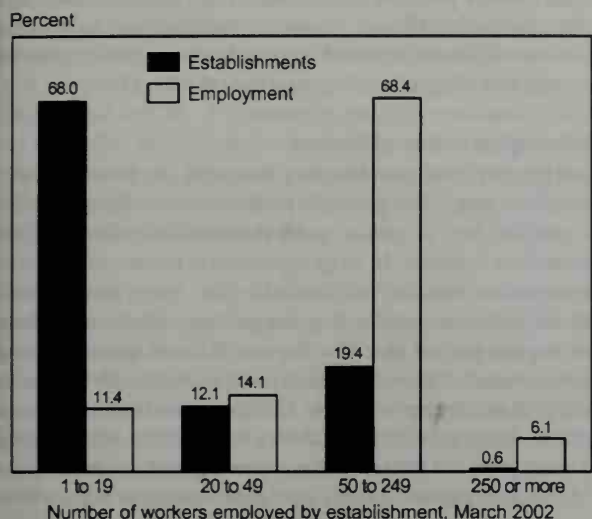
In 2002, cases of work-related injury and illness averaged 7.3 per 100 full-time workers in grocery stores, compared with 5.3 per 100 full-time workers in the entire private sector. Some injuries occur while workers transport or stock goods. Persons in food processing occupations, such as butchers and meatcutters, as well as cashiers working with computer scanners or traditional cash registers, may be vulnerable to cumulative trauma and other repetitive motion injuries.

Employment

Grocery stores ranked among the largest industries in 2002, providing 2.5 million wage and salary jobs. About 30 percent of all grocery store employees worked part time, and the average workweek of nonsupervisory workers was 30 hours. Some self-employed workers also worked in grocery stores, mostly in smaller establishments.

In 2002, there were about 86,000 grocery stores throughout the Nation. Most grocery stores are small; about two-thirds employ fewer than 20 workers. Most jobs, however, are found in the largest stores. About three-quarters of workers were employed in grocery stores with more than 50 workers (see chart).

About 75 percent of the jobs in grocery stores are in establishments employing 50 or more workers



Many grocery store workers are young, with persons 16 to 24 years old holding 30 percent of the jobs. This reflects the large number of jobs in this industry open to young workers who have little or no work experience.

Occupations in the Industry

Grocery store workers stock shelves on the sales floor; prepare food and other goods; assist customers in locating, purchasing, and understanding the content and uses of various items; and provide support services to the establishment. If the store is part of a chain, many important tasks—such as marketing and promotion, inventory control and management, and financing—are done at a centralized corporate headquarters. However, 49 percent of all grocery store employees are cashiers or stock clerks and order fillers.

Cashiers make up the largest occupation in grocery stores, accounting for about one-third of all workers (table 1). They scan the items being purchased by customers, total the amount due, accept payment, make change, fill out charge forms, and produce a cash register receipt that shows the quantity and price of the items. In most supermarkets, the cashier passes the universal product code on the item's label across a computer scanner that identifies the item and its price, which is automatically relayed to the cash register. In some grocery stores, customers themselves scan and bag their purchases, and pay using an automatic payment terminal, a system known as self-checkout. Cashiers verify that the items have been paid for before the customer leaves. In other grocery stores, the cashier reads a hand-stamped price on the item and keys that price directly into the cash register. Cashiers then place items in bags for customers; accept cash, personal check, credit card, or electronic debit card payments; and make change. When cashiers are not needed to check out customers, they sometimes assist other workers.

Stock clerks and order fillers are the second largest occupation in grocery stores, accounting for 17 percent of workers. They fill the shelves with merchandise and arrange displays to

attract customers. In stores without computer scanning equipment, stock clerks and order fillers may have to manually mark prices on individual items and count stock for inventory control.

Many office clerical workers—such as *secretaries and administrative assistants*; *general office clerks*; and *bookkeeping, accounting, and auditing clerks*—prepare and maintain the records necessary to keep grocery stores running smoothly.

Butchers and other meat, poultry, and fish processing workers prepare meat, poultry, and fish for purchase by cutting up and trimming carcasses and large sections into smaller pieces, which they package, weigh, price, and place on display. They also prepare ground meat from other cuts and fill customers' special orders. These workers also may prepare ready-to-heat foods by filleting or cutting meat, poultry, or fish into bite-sized pieces, preparing and adding vegetables, or applying sauces or breading. Butchers and other meat, poultry, and fish processing

Table 1. Employment of wage and salary workers in grocery stores by occupation, 2002 and projected change, 2002-12. (Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	2,478	100.0	5.4
Management, business, and financial occupations	65	2.6	8.7
Top executives	40	1.6	7.5
Professional and related occupations	45	1.8	46.0
Service occupations	317	12.8	16.1
First-line supervisors/managers of food preparation and serving workers	25	1.0	20.1
Food preparation workers	111	4.5	26.6
Food and beverage serving workers	124	5.0	10.4
Sales and related occupations	1,023	41.3	7.9
First-line supervisors/managers of retail sales workers	136	5.5	7.6
Cashiers	807	32.6	8.1
Retail salespersons	44	1.8	3.4
Office and administrative support occupations	550	22.2	-4.7
Financial clerks	25	1.0	-5.1
Customer service representatives	43	1.7	10.4
Stock clerks and order fillers	411	16.6	-6.3
Production occupations	176	7.1	-0.9
Bakers	45	1.8	10.4
Butchers and meat cutters	87	3.5	-11.7
Transportation and material moving occupations	293	11.8	0.4
Laborers and freight, stock, and material movers, hand	33	1.4	-11.4
Packers and packagers, hand	239	9.6	1.5

NOTE: May not add to totals due to omission of occupations with small employment.

workers often work from a central facility, from which smaller packages are sent to area stores.

Some specialty workers prepare food for sale in the grocery store and work in kitchens that may not be located in the store. *Bakers* produce breads, rolls, cakes, cookies, and other baked goods. *Chefs and head cooks* direct the preparation, seasoning, and cooking of salads, soups, fish, meats, vegetables, desserts, or other foods. Some plan and price menu items, order supplies, and keep records and accounts. *Cooks and food preparation workers* make salads—such as coleslaw or potato, macaroni, or chicken salad—and other entrees, and prepare ready-to-heat foods—such as burritos, marinated chicken breasts, or chicken stir-fry—for sale in the delicatessen or in the gourmet food or meat department. Other food preparation workers arrange party platters or prepare various vegetables and fruits that are sold at the salad bar.

Demonstrators and product promoters may offer samples of various products to entice customers to purchase them.

In supermarkets that serve food and beverages for consumption on the premises, *food and beverage serving workers* take orders and serve customers at counters. They may prepare short-order items, such as salads or sandwiches, to be taken out and consumed elsewhere. *Building cleaning workers* keep the stores clean and orderly.

In the warehouses and stockrooms of large supermarkets, *hand laborers and freight, stock, and material movers* move stock and goods in storage and deliver them to the sales floor; they also help load and unload delivery trucks. *Hand packers and packagers*, also known as courtesy clerks or baggers, perform a variety of simple tasks, such as bagging groceries, loading parcels in customers' cars, and returning unpurchased merchandise from the checkout counter to shelves.

First-line managers of retail sales workers supervise mostly entry-level employees at the grocery, produce, meat, and other specialty departments. These managers train employees and schedule their hours; oversee ordering, inspection, pricing, and inventory of goods; monitor sales activity; and make reports to store managers. *General and operations managers* are responsible for the efficient and profitable operation of grocery stores. Working through their department managers, general and operations managers may set store policy, hire and train employees, develop merchandising plans, maintain good customer and community relations, address customer complaints, and monitor the store's profits or losses.

Purchasing managers plan and direct the task of purchasing goods for resale to consumers. Purchasing managers must thoroughly understand grocery store foods, other items, and each store's customers. They must select the best suppliers and maintain good relationships with them. Purchasing managers evaluate their store's sales reports to determine what products are in demand and plan purchases according to their budget.

Because of the expansion of the industry to meet the consumers' desire for "one-stop shopping," grocery stores have begun to employ an array of workers to help meet that need. For example, *marketing and sales managers* forecast sales and develop a marketing plan based on demographic trends, sales data, community needs, and consumer feedback. *Pharmacists* fill cus-

tomers' drug prescriptions and advise them on over-the-counter medicines. *Inspectors, testers, sorters, samplers, and weighers* assess whether products and facilities meet quality, health, and safety standards. *Human resources, training, and labor relations specialists* are responsible for making sure that employees maintain and, if necessary, improve their skill levels.

Training and Advancement

Most grocery store jobs are entry-level and can be learned in a short time. Employers generally prefer high school graduates for occupations such as cashier, stock clerk and order filler, or food preparation workers. In large supermarket chains, prospective employees are matched with available jobs, hours, and locations and are sent to a specific store for on-the-job training. Many cashiers are trained in a few days, with some stores offering formal classroom training to familiarize workers with the equipment with which they will work. Meatcutters and bakers are more skilled. Trade schools and industry associations offer training for these jobs, but the skills also can be learned on the job.

College graduates will fill most new management positions. Employers increasingly seek graduates of college and university, junior and community college, and technical institute programs in food marketing, food management, and supermarket management. Many supermarket chains place graduates of these programs, or of bachelor's or master's degree programs in business administration, in various professional positions or management training programs in areas such as logistics, supply chain, marketing, replenishment, food safety, human resources, and strategic planning. Management trainees start as assistant or department managers and, depending on experience and performance, may advance to positions of greater responsibility. It is not unusual for managers to supervise a large number of employees early in their careers.

Courtesy clerks sometimes advance to work as service clerks in the delicatessen or bakery, stock clerks and order fillers, or perhaps cashiers. Sometimes, workers rotate assignments in a supermarket; for example, a cashier might occasionally wrap meat. Union contracts, however, may have strict occupational definitions in some stores, making movement among departments difficult.

Entry-level workers may advance to management positions, depending on experience and performance. Grocery store management has become increasingly complex and technical. Managers of some large supermarkets are responsible for millions of dollars in yearly revenue and for hundreds of employees. They use computers to manage budgets, schedule work, track and order products, price goods, manage shelf space, and assess product profitability. Many stores that promote from within have established tracks by which workers move from department to department, gaining broad experience, until they are considered ready for an entry-level management position. Opportunities for advancement to management jobs exist in both large supermarket chains and in small, independent grocery stores.

Grocery store jobs call for various personal attributes. Almost all workers must be in good physical condition. Because managers, cashiers, stock clerks and order fillers, and other workers on the sales floor constantly deal with the public, a neat

appearance and a pleasant, businesslike manner are important. Cashiers and stock clerks and order fillers must be able to do repetitious work accurately while under pressure. Cashiers need basic arithmetic skills, good hand-eye coordination, and manual dexterity. Stock clerks and order fillers, especially, must be in good physical condition because of the lifting, crouching, and climbing that they do. For managers, good communication skills and the ability to solve problems quickly, and to perform well under pressure are important. In addition, personal qualities such as initiative, the ability to focus on detail, and leadership ability are essential for managers.

Earnings

Average weekly earnings in grocery stores are considerably lower than the average for all industries, reflecting the large proportion of entry-level, part-time jobs. In 2002, nonsupervisory workers in grocery stores averaged \$335 a week, compared with \$506 a week for all workers in the private sector. Earnings in selected occupations in grocery stores appear in table 2.

Managers receive a salary, and often a bonus based on store or department performance. Managers in highly profitable stores generally earn more than those in less profitable stores.

Full-time workers generally receive typical benefits, such as paid vacations, sick leave, and health and life insurance. Part-time workers who are not unionized may receive few benefits. Unionized part-time workers sometimes receive partial benefits. Grocery store employees may receive a discount on purchases.

About 22 percent of all employees in grocery stores belong to a union or are covered by union contracts, compared with about 15 percent in all industries. Workers in chain stores are more likely to be unionized or covered by contracts than are workers in independent grocery stores. In independent stores, wages often are determined by job title, and increases are tied to length of job service and to job performance. The United Food and Commercial Workers International Union is the primary union representing grocery store workers.

Outlook

Employment in grocery stores is expected to increase about 5 percent by the year 2012, compared with the 16-percent growth projected for all industries combined. Many additional job openings will arise from the need to replace workers who transfer to jobs in other industries, retire, or stop working for other reasons. Replacement needs are particularly significant due to the industry's large size and the high rate of turnover among cashiers and other workers who do not choose to pursue grocery industry careers.

Employment will grow as the population increases and as more grocery stores offer a wider array of goods and services that include prescription drugs, dry cleaning, film developing, flowers, liquor, and carryout food, as well as banking, postal, and catering services. Grocery stores are adding and enhancing delicatessens, bakeries, and meat and seafood departments to counter the trend toward eating away from home, as well as adding ready-to-eat-meals to compete with fast-food restaurants. The trend toward opening "supercenters," where a myriad of products and services are available at a single location, is increasingly popular. These expansions are expected to create many new jobs.

Table 2. Median hourly earnings of the largest occupations in grocery stores, 2002

Occupation	Grocery stores	All industries
General and operations managers	\$23.89	\$32.80
First-line supervisors/managers of retail sales workers	14.39	14.28
First-line supervisors/managers of food preparation and serving workers	13.81	11.73
Butchers and meat cutters	13.09	12.26
Bakers	9.84	9.89
Retail salespersons	8.96	8.51
Stock clerks and order fillers	8.58	9.26
Food preparation workers	8.43	7.85
Customer service representatives	8.29	12.62
Combined food preparation and serving workers, including fast food	8.14	6.97
Laborers and freight, stock, and material movers, hand	8.11	9.48
Cashiers	7.57	7.41
Packers and packagers, hand	6.97	8.03

Some technological advances—such as computer scanning cash registers and automated warehouse equipment—have boosted productivity, but these innovations are not expected to adversely affect employment levels. In fact, past technological improvements like scanners and electronic data interchange are expected to improve opportunities in areas such as category management and distribution. Increasing competition from large discount department stores will encourage the industry to continue to improve its efficiency by adopting new technologies and procedures and by eliminating redundancies, especially in the supply chains. Increasingly, many stores let customers process their own transactions with almost no interaction with a cashier. The growing use of self-checkout machines at grocery stores may have a slightly adverse effect on employment of cashiers. This trend, however, will depend largely on the public's acceptance of automated checkouts. On the other hand, many other tasks, such as stocking shelves on the sales floor or helping a customer find a product, cannot be performed effectively by machines. In addition, many consumers have demonstrated their strong desire for personal services. For example, consumers want managers to answer questions about store policy and services; they want cashiers and courtesy clerks to answer questions, bag goods, or help them bring groceries to their cars; and they want workers in specialty departments to advise them on their purchases and fill personal orders by providing special cuts of meat, fish, or poultry.

Projected growth for some grocery store occupations differs from the 5-percent growth projected for the industry as a whole. For example, employment of bakers and food preparation and serving related occupations is expected to grow faster than the industry because of the popularity of freshly baked breads and pastries, carryout food, and catering services. On the other hand, employment of butchers and other meat, poultry, and fish processing workers is expected to grow more slowly than the industry as more meatcutting, processing, and packaging shifts from the retail store to the manufacturing plant.

Electronic shopping currently is gaining in popularity across the country. Its impact on industry employment could be signifi-

cant within the near future, depending on how fast consumers adopt the new technology. Growth of online grocery shopping, however, may be tempered by several factors, including logistical complications, particularly in rural areas, and the expense of delivering perishable goods in a timely manner.

Unlike many other industries, the grocery industry is not highly sensitive to changes in economic conditions. Even during periods of recession, demand for food is likely to remain relatively stable.

Sources of Additional Information

For information on job opportunities in grocery stores, contact individual stores or the local office of the State employment service.

General information on careers in grocery stores is available from:

- United Food and Commercial Workers International Union, Education Office, 1775 K St. NW., Washington, DC 20006-1502.
- Food Marketing Institute, 655 15th St. NW., Suite 700, Washington, DC 20005. Internet: <http://www.fmi.org>
- National Association of Convenience Stores, 1605 King St., Alexandria, VA 22314.
- International Foodservice Distributors Association, 201 Park Washington Court, Falls Church, VA 22046-4521.

Information on most occupations in grocery stores, including the following, appears in the 2004-05 *Occupational Outlook Handbook*:

- Advertising, marketing, promotions, public relations, and sales managers
- Building cleaning workers
- Cashiers
- Chefs, cooks, and food preparation workers
- Demonstrators, product promoters, and models
- Food and beverage serving and related workers
- Food processing occupations
- Food service managers
- Human resources, training, and labor relations managers and specialists
- Material-moving occupations
- Pharmacists
- Pharmacy aides
- Pharmacy technicians
- Purchasing managers, buyers, and purchasing agents
- Retail salespersons
- Sales worker supervisors
- Stock clerks and order fillers

SIGNIFICANT POINTS

- Most workplaces are small, employing fewer than 50 workers.
- About two-thirds work in office and administrative support, sales, or transportation and material-moving occupations.
- While some jobs require a college degree, a high school education is sufficient for most jobs.
- Consolidation and new technology should slow employment growth in some occupations, but many new jobs will be created in other occupations.

Nature of the Industry

When consumers purchase goods, they usually buy them from a retail establishment, such as a supermarket, department store, gas station, or Internet site. When retail establishments, other businesses, governments, or institutions—such as universities or hospitals—need to purchase goods for resale, equipment, office supplies, or any other items, they normally buy them from wholesale trade establishments.

Wholesale trade firms are essential to the economy. They buy large lots of goods, usually from manufacturers, and sell them in smaller quantities to businesses, governments, other wholesalers, or institutional customers. They simplify product, payment, and information flows by acting as intermediaries between the manufacturer and the final customer. They store goods that neither manufacturers nor retailers can store until consumers require them. In so doing, they fill several roles in the economy. They provide businesses a nearby source of goods made by many different manufacturers; they provide manufacturers with a manageable number of customers, while allowing their products to reach a large number of users; and they allow manufacturers, businesses, institutions, and governments to devote minimal time and resources to transactions by taking on some sales and marketing functions—such as customer service, sales contact, order processing, and technical support—that manufacturers otherwise would have to perform.

The wholesale trade industry is divided into three sectors: Merchant wholesalers, durable goods; merchant wholesalers, nondurable goods; and wholesale electronic markets and agents and brokers.

Firms in the *merchant wholesalers, durable goods* sector sell capital or durable goods to other businesses. Merchant wholesalers generally take title to the goods that they sell; in other words, they buy and sell goods on their own account. Durable goods are new or used items that generally have a normal life expectancy of 3 years or more. Establishments in this sector of wholesale trade are engaged in wholesaling durable goods, such as motor vehicles, furniture, construction materials, machinery and equipment (including household appliances), metals and minerals (except petroleum), sporting goods, toys and hobby goods, recyclable materials, and parts.

Firms in the *merchant wholesalers, nondurable goods* sector sell nondurable goods to other businesses. Nondurable goods are items that generally have a normal life expectancy of less than 3 years. Establishments in this sector of wholesale trade are engaged in wholesaling nondurable goods, such as paper and paper products, chemicals and chemical products, drugs, textiles and textile products, apparel, footwear, groceries, farm products, petroleum and petroleum products, alcoholic beverages, books, magazines, newspapers, flowers and nursery stock, and tobacco products.

Firms in the *wholesale electronic markets and agents and brokers* sector arrange for the sale of goods owned by others, generally on a fee or commission basis. They act on behalf of the buyers and sellers of goods, but generally do not take ownership of the goods. This sector includes agents and brokers as well as business-to-business electronic markets that use electronic means, such as the Internet or Electronic Data Interchange (EDI), to facilitate wholesale trade.

Only firms that sell most of their wares to businesses, institutions, and governments are considered part of wholesale trade. As a marketing ploy, many retailers that sell mostly to the general public present themselves as wholesalers. For example, “wholesale” price clubs, factory outlets, and other organizations are retail establishments, even though they sell their goods to the public at “wholesale” prices.

The size and scope of firms in the wholesale trade industry vary greatly. Wholesale trade firms sell any and every type of good. From wholesale trade firms, customers buy goods for use in making other products, as in the case of a bicycle manufacturer that purchases steel tubing, wire cables, and paint; for use in the course of daily operations, as when a corporation buys office furniture, paper clips, or computers; or for resale to the public, as does a department store that purchases socks, flatware, or televisions. Wholesalers may offer only a few items for sale, perhaps all made by one manufacturer, or they may offer thousands of items produced by hundreds of different manufacturers. Wholesalers may sell only a narrow range of goods, such as very specialized machine tools, or a broad range of goods, such as all the supplies necessary to open a new store, including shelving, light fixtures, wallpaper, floor coverings, signs, cash

registers, accounting ledgers, and perhaps even some merchandise for resale.

Besides selling and moving goods to their customers, merchant wholesalers may provide other services to clients, such as the financing of purchases, customer service and technical support, marketing services such as advertising and promotion, technical or logistical advice, and installation and repair services. After customers buy equipment, such as cash registers, copiers, computer workstations, or various types of industrial machinery, assistance may be needed to integrate the products into the customer's workplace. Wholesale trade firms often employ workers to visit customers, install or repair equipment, train users, troubleshoot problems, or advise on how to use the equipment most efficiently.

Working Conditions

Working conditions and physical demands of wholesale trade jobs vary greatly. Moving stock and heavy equipment can be strenuous, but freight, stock, and material movers may make use of forklifts in large warehouses. Workers in some automated warehouses use computer-controlled storage and retrieval systems that further reduce labor requirements. Employees in refrigerated meat warehouses work in a cold environment, and those in chemical warehouses often wear protective clothing to avoid harm from toxic chemicals. Outside sales workers are away from the office for much of the workday and may spend a considerable amount of time traveling. On the other hand, most management, administrative support, and marketing staff work in offices.

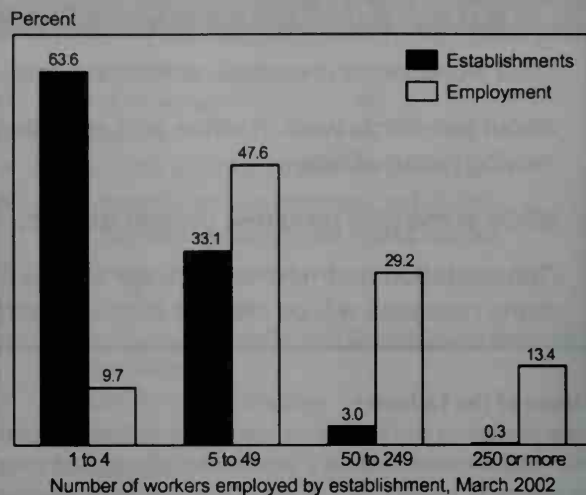
Overall, work in wholesale trade is relatively safe. In 2002, there were 5.2 work-related injuries or illnesses per 100 full-time workers, comparable with the rate of 5.3 per 100 for the entire private sector. Not all wholesale trade sectors are equally safe, however. Occupational injury and illness rates were considerably higher than the national average for wholesale trade workers who dealt with lumber and construction materials (6.7 per 100 workers); metals and minerals (8.7 per 100 workers); groceries (8.6 per 100 workers); and beer, wine, and distilled beverages (10.0 per 100 workers).

Most workers put in long shifts, particularly during peak times, and others, such as produce wholesalers, work unusual hours. The latter group of workers must be on the job early in the morning to receive shipments of vegetables and fruits, and they must be ready to deliver goods to local grocers at dawn.

Employment

Wholesale trade accounted for about 5.6 million wage and salary jobs in 2002. More than 219,000 workers in the wholesale trade industry were self-employed. Over 97 percent of the establishments in the industry are small, employing fewer than 50 workers, and they have over half of the industry's jobs (see chart). Although some large firms employ many workers, wholesale trade is characterized by a large number of relatively small establishments when compared with other industries. Wholesale trade workers are spread throughout the country, have relatively low union membership, and are more likely to work full time than are workers in most other industries.

More than 97 percent of the establishments in wholesale trade employ fewer than 50 workers, and they have more than half of the industry's jobs



Occupations in the Industry

Many occupations are involved in wholesale trade, but not all are represented in every type of wholesale trade firm. Merchant wholesalers, by far, make up the largest part of the industry. The activities of wholesale trade firms commonly center on storing, selling, and transporting goods. As a result, the three largest occupational groups in the industry are *office and administrative support workers*, many of whom work in inventory management; *sales and related workers*; and workers in *transportation and material moving occupations*, most of whom are truck drivers and material movers. In 2002, 68 percent of wholesale trade workers were concentrated in these three groups (table 1).

Most office and administrative support workers need to have at least a high school diploma, and some related experience or additional schooling is an asset. As in most industries, many *secretaries and administrative assistants*, *bookkeeping, accounting and auditing clerks*, and *general office clerks* are employed in wholesale trade. Most of the other administrative support workers are needed to control inventory. *Shipping, receiving, and traffic clerks* check the contents of all shipments, verifying condition, quantity, and sometimes shipping costs. They may use computer terminals or barcode scanners and, in small firms, may pack and unpack goods. *Order clerks* handle order requests from customers, or from the firm's regional branch offices in the case of a large, decentralized wholesaler. These workers take and process orders, and route them to the warehouse for packing and shipment. Often, they must be able to answer customer inquiries about products and monitor inventory levels or record sales for the accounting department. *Stock clerks and order fillers* code or price goods and store them in the appropriate warehouse sections. They also retrieve from stock the appropriate type and quantity of goods ordered by customers. In some cases, they also may perform tasks similar to those performed by shipping and receiving clerks.

Like office and administrative support workers, sales and related workers typically do not need postsecondary training, but many employers seek applicants with prior sales experience. Generally, workers in marketing and sales occupations try to interest customers and assist them in purchasing a wholesale firm's goods. There are three primary types of sales people in wholesale firms: Inside sales workers, outside sales workers, and sales worker supervisors.

Inside sales workers generally take sales orders from customers. *Counter clerks* wait on customers who come to the firm to make a purchase. Outside sales workers, also called *sales representatives* or *sales engineers*, are the most skilled workers and one of the largest occupations in wholesale trade. They travel to customers' places of business—whether manufacturers, retailers, or institutions—to maintain current customers or to attract new ones. They make presentations to buyers and management or may demonstrate items to production supervisors. Sales representatives must be very knowledgeable about product operation, prices, maintenance needs, and capabilities and must be thoroughly familiar with customers' needs and business goals so that they can suggest how customers can use products to their greatest advantage. For example, sales representatives or sales engineers sometimes advise manufacturers on how to use a new piece of equipment to make production more efficient or may train workers to use the equipment. In the case of complex equipment, sales engineers may need a great deal of highly technical knowledge. For this reason, some outside sales workers need to have postsecondary technical education. Sales representatives and sales engineers also may be known as manufacturers' representatives or agents in some wholesale trade firms. *Sales worker supervisors* monitor and coordinate the work of the sales staff and often do outside sales work themselves.

Transportation and material-moving workers move goods around the warehouse, pack and load goods for shipment, and transport goods to buyers. *Laborers and freight, stock, and material movers* manually move goods to or from storage and help to load delivery trucks. *Hand packers and packagers* also prepare items for shipment. *Industrial truck and tractor operators* use forklifts and tractors with trailers to transport goods within the warehouse, to outdoor storage facilities, or to trucks for loading. *Truck drivers* transport goods between the wholesaler and the purchaser or between distant warehouses. Drivers of medium and heavy trucks need a State Commercial Driver's License (CDL). *Driver/sales workers* deliver goods to customers, unload goods, set up retail displays, and take orders for future deliveries. They are responsible for maintaining customer confidence and keeping clients well-stocked. Sometimes these workers visit prospective clients, in hopes of generating new business.

Management and business and financial operations workers direct the operations of firms. *General and operations managers* and *chief executives* supervise workers and ensure that operations meet standards and goals set by top management. Managers with ownership interest in smaller firms often also have some sales responsibilities. *First-line supervisors* oversee warehouse workers—such as clerks, material movers, and truck drivers—and see that standards of efficiency are maintained.

Table 1. Employment of wage and salary workers in wholesale trade by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	5,641	100.0	11.3
Management, business, and financial occupations	575	10.2	18.6
Top executives	195	3.5	15.7
Advertising, marketing, promotions, public relations, and sales managers	67	1.2	27.6
Operations specialties managers	108	1.9	18.7
Buyers and purchasing agents	72	1.3	8.8
Professional and related occupations	309	5.5	24.7
Computer specialists	148	2.6	25.6
Sales and related occupations	1,395	24.7	17.2
First-line supervisors/managers of non-retail sales workers	106	1.9	21.7
Retail sales workers	194	3.4	3.6
Sales representatives, wholesale and manufacturing	958	17.0	20.0
Office and administrative support occupations	1,347	23.9	1.4
First-line supervisors/managers of office and administrative support workers	85	1.5	2.1
Bookkeeping, accounting, and auditing clerks	141	2.5	0.9
Customer service representatives ..	112	2.0	21.1
Order clerks	85	1.5	-11.5
Shipping, receiving, and traffic clerks	176	3.1	0.5
Stock clerks and order fillers	197	3.5	-5.5
Secretaries and administrative assistants	135	2.4	-3.1
Office clerks, general	170	3.0	3.1
Installation, maintenance, and repair occupations	391	6.9	16.4
Electrical and electronic equipment mechanics, installers, and repairers	87	1.5	14.4
Industrial machinery installation, repair, and maintenance workers	74	1.3	17.0
Production occupations	386	6.8	13.9
Miscellaneous assemblers and fabricators	112	2.0	9.3
Metal workers and plastic workers	68	1.2	17.2
Transportation and material moving occupations	1,109	19.7	5.8
Driver/sales workers	100	1.8	5.1
Truck drivers, heavy and tractor-trailer	186	3.3	13.3
Truck drivers, light or delivery services	178	3.2	12.6
Industrial truck and tractor operators	97	1.7	10.1
Laborers and freight, stock, and material movers, hand	344	6.1	-5.0
Packers and packagers, hand	83	1.5	12.4

NOTE: May not add to totals due to omission of occupations with small employment.

In order to provide manufactured goods to businesses, governments, or institutional customers, merchant wholesalers employ large numbers of *wholesale buyers* and *purchasing managers*. Wholesale buyers purchase goods from manufacturers for resale, based on price and what they think customers want. Purchasing managers coordinate the activities of buyers and determine when to purchase what types and quantities of goods.

Many wholesalers do not just sell goods to other businesses; they may also install and service these goods. *Installation, maintenance, and repair workers* set up, service, and repair these goods. Others maintain vehicles and other equipment. For these jobs, firms usually hire workers with maintenance and repair experience or mechanically inclined individuals who can be trained on the job.

Training and Advancement

Although some workers need a college degree, most jobs in wholesale trade can be entered without education beyond high school. New workers usually receive training after they begin work—for instance, in operation of inventory management databases, online purchasing systems, or electronic data interchange systems. Technological advances and market forces are rapidly altering this industry. Even workers in small firms need to keep informed about new selling techniques, management methodologies, and information systems. In addition, technological advances affect the skill requirements for occupations across the entire industry—from warehouse workers to truck drivers to managers. As a result, numerous firms devote significant resources to worker training.

Many firms offer on-the-job training. However, as providing training is becoming more costly and complex, the industry is increasingly using third-party training organizations and trade associations to reduce this burden. To increase productivity, many companies make their employees responsible for more than one function and cross-train them by familiarizing them with many aspects of the company.

Wholesale trade has historically offered good advancement opportunities from the least-skilled jobs up through management positions. For example, unskilled workers can start in the warehouse or stock room. After they become familiar with the products and procedures of the firm, workers may be promoted to counter sales or even to inside sales positions. Others may be trained to install, service, and repair the products sold by the firm. Eventually, workers may advance to outside sales positions or to managerial positions. Wholesale trade firms often emphasize promotion from within, especially in the numerous small businesses in the industry. Even in some of the largest firms, it is not uncommon to find top executives who began as part-time warehouse help.

As the wholesale trade industry changes in the coming years, advancement opportunities could become more limited. Increasing use of the Internet and other electronic means of communication, as well as changing sales techniques, are placing increasing demands on managers, so it will become more difficult to promote less educated workers from within the firm. However, consolidation among wholesale trade firms has resulted in larger

companies with more advancement opportunities for those with the appropriate skills. Currently, several large firms in this industry have formal management training programs that train college graduates for management positions, and the number of these programs will probably grow. There are also a growing number of industrial distribution programs at universities, providing students with both business and technical training. All workers should expect to periodically take classes and seminars to learn new skills as the industry adapts to new technology and business practices.

In addition to advancement opportunities within a firm, there also are opportunities for self-employment. For example, because brokers match buyers with sellers and never actually own goods, individuals with the proper connections can establish wholesale brokerage businesses with only a small investment—perhaps working out of their home. Moreover, establishing a wholesale distribution business can be easier than establishing many other kinds of businesses. Wholesalers that get exclusive distribution rights to popular items can become profitable quickly; although wholesale distribution firms usually require a substantial investment, obtaining rights to a successful product can be the foundation of a successful new business.

Earnings

Nonsupervisory wage and salary workers in wholesale trade averaged \$644 a week in 2002, higher than the average of \$506 a week for the entire workforce. Earnings varied greatly among specialties in wholesale trade. For example, in the area with the highest earnings—commercial equipment—workers averaged \$821 a week; but in the area with the lowest earnings—farm-product raw materials—workers made \$431 a week. Earnings in selected occupations in wholesale trade appear in table 2.

Part of the earnings of some workers is based on performance, especially in the case of outside sales workers, who frequently receive commissions on their sales. Although many sales workers receive a base salary in addition to commission, some receive compensation based solely on sales revenue. Performance-based compensation may become more common among other occupations as wholesaling firms attempt to offer more competitive compensation packages.

Like earnings, benefits vary widely from firm to firm. Some small firms offer few benefits. Larger firms may offer common benefits such as life insurance, health insurance, and a pension. Only about 5 percent of workers in the wholesale trade industry were union members or were covered by union contracts in 2002, compared with about 15 percent of the entire workforce.

Outlook

Wage and salary jobs in wholesale trade are projected to grow by 11 percent over the 2002-12 period, compared with the 16-percent rate of growth projected for all industries combined. Growth will vary, however, depending on the sector of the economy with which individual wholesale trade firms are involved. For example, the food service industry is expected to

Table 2. Median hourly earnings of the largest occupations in wholesale trade, 2002

	Merchant wholesalers, durable goods	Merchant wholesalers nondurable goods	Wholesale electronic markets and agents and brokers	All industries
General and operations managers	\$39.75	\$36.17	\$42.70	\$32.80
First-line supervisors/managers of non-retail sales workers	30.49	27.45	35.58	25.49
Sales representatives, wholesale and manufacturing, except technical and scientific products	20.72	20.32	23.23	20.54
Truck drivers, heavy and tractor-trailer	14.31	15.97	15.89	15.97
Bookkeeping, accounting, and auditing clerks	13.50	12.90	13.63	13.16
Parts salespersons	13.16	10.89	12.24	11.51
Shipping, receiving, and traffic clerks	11.42	11.81	11.59	11.26
Stock clerks and order fillers	10.86	10.62	11.11	9.26
Truck drivers, light or delivery services	10.76	11.82	11.81	11.48
Laborers and freight, stock, and material movers, hand	10.06	10.03	9.13	9.48

grow faster than the retail food industry as consumers increasingly eat at restaurants instead of eating at home. Therefore, the demand for wholesale trade services for food service establishments will grow faster than that for retail food establishments. Industry trends also will change the composition and nature of wholesale trade employment. Consolidation of the industry into larger firms and the spread of new technology (such as electronic commerce, also known as "e-commerce") should have their greatest affect on the two largest occupational groups in wholesale trade—office and administrative support, and sales and related occupations. However, as firms provide a growing array of support services, many new jobs will be created and the roles of many workers will change.

The trend toward consolidation of wholesale trade firms into fewer and larger companies is likely to remain strong. Globalization and cost pressures should continue to force wholesale distributors to merge with other firms, or to acquire smaller firms. As retail firms grow, the demand for large, national wholesale distributors to supply them will increase. But small, geographically isolated wholesalers may continue to form national alliances that will be more versatile in fulfilling customer orders. The differences between large and small firms will become more pronounced as they compete less for the same customers, and instead emphasize their area of expertise. The resulting consolidation of wholesale trade into fewer, larger firms will reduce demand for some workers, as merged companies eliminate duplicated staff. At the same time, the expansion of customer services should increase demand for related workers. Office and administrative support workers and sales workers may advance to many of these new customer service and marketing jobs. New workers with the necessary education and training will be needed for financial, logistical, or technical positions.

E-commerce allows people and companies to instantly obtain price quotes and product information, make and process transactions, track product delivery, and share marketing information by using online exchanges or Electronic Data Interchange (EDI). However, previous technological improvements have already refined the distribution system in many areas of ordering, fulfillment, and purchasing. Improvements in technology will boost

worker productivity as customers purchase goods and track their delivery electronically, and more of the sales activities and customer service will be conducted without sales or customer service workers. Retailers, manufacturers, and other firms may increasingly purchase goods directly from manufacturers as systems for informing other parties of products, availability, and prices become more electronically integrated.

Further automation of recordkeeping, ordering, and processing will result in slower growth for office and administrative support occupations, compared with most other wholesale trade occupations. Use of computerized labels with barcodes allows stock clerks with scanners to immediately record locations, quantities, and types of goods in a computerized inventory management system. Customers frequently order and pay for goods electronically through the Internet or other special systems. Therefore, fewer bookkeeping, accounting, and auditing clerks will be needed as fewer paper transactions are conducted. Despite this new technology, some office and administrative support workers will still be needed to oversee the process and make adjustments when problems occur. These workers will need to be proficient with new computerized systems.

Although the demand for sales workers may be negatively impacted as the selling process becomes more automated, as customer service becomes more important the work of sales workers also will change. Work related to most of the sales that are not automated or transacted electronically will fall to inside sales workers. These sales workers will handle phone calls and solicit new business by telephone or over the Internet, and assist buyers with computerized purchases. However, more of outside sales workers' responsibilities will involve complex customer service work, such as visiting customers to solicit new business and to maintain good relations, aiding with installation and maintenance, and advising on the most efficient use of purchases.

Sources of Additional Information

For information about job opportunities in wholesale trade, contact local firms.

For general information on the wholesale trade industry, contact:

- National Association of Wholesaler-Distributors, 1725 K St. NW., Suite 300, Washington, DC 20006.

Information on careers for manufacturers' representatives and agents is available from:

- Manufacturers' Agents National Association, P.O. Box 3467, Laguna Hills, CA 92654-3467.
Internet: <http://www.manaonline.org>
- Manufacturers' Representatives Educational Research Foundation, P.O. Box 247, Geneva, IL 60134.
Internet: <http://www.mrerf.org>

Information on many key occupations in wholesale trade may be found in the 2004-05 *Occupational Outlook Handbook*:

- Bookkeeping, accounting, and auditing clerks

- Computer, automated teller, and office-machine repairers
- Order clerks
- Purchasing managers, buyers, and purchasing agents
- Sales engineers
- Sales representatives, wholesale and manufacturing
- Shipping, receiving, and traffic clerks
- Stock clerks and order fillers
- Truck drivers and driver/sales workers

Transportation and Utilities



SIGNIFICANT POINTS

- Although flight crews—pilots and flight attendants—are the most visible occupations, the vast majority of the industry's employees work in ground occupations.
- Senior pilots for major airlines are among the highest paid workers in the Nation.
- A bachelor's degree is increasingly required or preferred for most pilot and flight attendant jobs.
- More than 45 percent of workers are members of unions or covered by a union contract.

Nature of the Industry

Air travel in the U.S. grew at a rapid pace until 2001, expanding from 172 million passenger enplanements in 1970 to nearly 615 million in 2000. However, over the next 3 years, a combination of factors—the events of September 11th, 2001, an economic recession, and other factors—combined to reduce traffic back to 1995 levels. Nevertheless, air travel remains one of the most popular modes of transportation.

Airlines in this industry transport passengers and freight over regularly scheduled routes or on routes, called “charters,” specifically designed for a group of travelers or a particular cargo. Several classes of airlines function in the United States. There are 14 major passenger airlines—11 passenger and 3 all cargo, which the U.S. Department of Transportation defines as having operating revenues of more than \$1 billion. The largest of these, often called the “Big Six,” generally operate hub-and-spoke systems and also fly internationally. A hub is a centrally-located airport designated by an airline to receive a large number of its flights from many locations, and at which passengers can transfer to flights to any of the locations served by the airline's system. In this way, the greatest number of passengers, from as many locations as possible, can be served in the most efficient way.

In competition with the Big Six are 6 to 10 low-cost low-fare carriers. These carriers have traditionally not used hub and spoke systems and offered flights between limited numbers of cities. They have primarily focused on flying shorter routes (400 miles or less) and on serving leisure travelers. But some low-fare carriers are expanding their routes to include longer transcontinental and nonstop flights. These moves have helped low-fare carriers expand their customer base to include more business travelers.

Another type of passenger airline carrier is the commuter or regional carrier. There are approximately 25 to 30 of these carriers. Regional airlines operate short- and medium-haul scheduled airline service connecting smaller communities with larger cities and with hubs. Some of the largest regional carriers are subsidiaries of the major airlines, but most are independently owned, often contracting their services to the majors. The regional airlines' fleet consists primarily of smaller 19- to 68-seat turboprop and 30- to 100-seat jet aircraft. The regional airlines are the fastest growing segment of commercial aviation with 1 out of every 8 domestic airline passengers flying on a regional airline during at least part of his or her trip.

Air cargo is another sector of the airline industry. Cargo can be carried in cargo holds of passenger airlines or on aircraft designed exclusively to carry freight. Cargo carriers in this industry do not provide door-to-door service. Instead, they provide only air transport from an airport near the cargo's origin to an airport near the cargo's destination. Companies in the Couriers and Messengers industry provide door-to-door delivery of parcels either across town or across the continent.

Most sectors of the airline industry were in a downturn in 2002, with several passenger airlines having declared bankruptcy and others on the verge of doing so. After 6 relatively successful years in the late 1990's, fueled by an increase in passenger volume and a booming economy, the growth in airline passenger traffic began to slow in 2001, coinciding with the economic recession. After the tragic events of September 11, 2001, passenger traffic dropped steeply, causing airlines to cut flights, lay off workers, and park surplus aircraft. Although passenger volume has since recovered somewhat, the growth rate in the industry will likely continue to be depressed for several years.

As the low-fare airlines continue to take market share away from the higher cost major airlines, and as passenger traffic remains lower, managing costs has become more critical to the survival of some airlines. Labor costs are the airlines' largest cost component—amounting to 38 percent of some airlines' operating costs—and reducing these costs is a key part of the recovery plans of several major airlines. Because the number of aircraft flight personnel often is fixed by passenger safety regulations, reducing costs usually involves getting the unions representing workers in the air transportation industry to renegotiate their contracts and agree to reduce wages.

The airline industry faces many challenges in the future. Airlines must focus on cost control, cash preservation and cautious growth. The goal of the industry is to be prepared to respond quickly to economic recovery. Passenger volume should slowly improve, but it will take longer for rapid employment growth to return to the air transportation industry.

Working Conditions

Working conditions in air transportation vary widely, depending on the occupation. Although most employees work in fairly comfortable surroundings, such as offices, terminals, or airplanes, mechanics and others who service aircraft are subject to noise, dirt, and grease and sometimes work outside in bad weather.

In 2002, the air transportation industry had 11.8 injuries and illnesses per 100 full-time workers, compared with 5.3 throughout private industry. Virtually all work-related fatalities resulted from transportation accidents.

Because airlines operate flights at all hours of the day and night, many workers have irregular hours or variable work schedules. Flight and ground personnel, including mechanics and reservation and transportation ticket agents, may have to work at night or on weekends or holidays. Flight personnel may be away from their home bases frequently. When they are away from home, the airlines provide them with hotel accommodations, transportation between the hotel and airport, and an allowance for meals and expenses. Flight attendants typically fly from 75 to 85 hours a month. In addition to flight time, they have about 50 hours a month duty time between flights.

Flight crews, especially those on international routes, often suffer jet lag—disorientation and fatigue caused by flying into different time zones. Because employees must report for duty well-rested, they must allow ample time to rest during their layovers.

Employment

The air transportation industry provided 559,000 wage and salary jobs in 2002. Most employment is found in larger establishments—nearly 2 out of 3 jobs are in establishments with 1,000 or more workers. However, nearly three-fourths of all establishments employ fewer than 20 workers (chart).

Most air transportation jobs are at major airports located close to cities. A substantial proportion are at airports that serve as central hubs for major airlines.

Occupations in the Industry

Although pilots and flight attendants are the most visible occupations in this industry, almost 70 percent of all employees in air transportation work on the ground in what are called ground occupations (table 1). Two of the largest ground occupations

are *aircraft mechanics and service technicians* and *reservation and transportation ticket agents and travel clerks*.

Aircraft mechanics and service technicians service, inspect, and repair planes. They may work on several different types of aircraft, such as jet transports, small propeller-driven airplanes, or helicopters. Many specialize working on either the airframe (the body of the aircraft), the powerplant (the engines), or avionics (the parts of an aircraft that depend on electronics, such as navigation and communication equipment). In small, independent repair shops, mechanics and technicians usually inspect and repair many different types of aircraft.

Some mechanics and technicians specialize in scheduled maintenance required by the Federal Aviation Administration (FAA). Following a schedule based on the number of hours flown, calendar days, cycles of operation, or a combination of these factors, mechanics inspect the engines, landing gear, instruments, and other parts of aircraft and perform necessary maintenance and repairs.

A *reservation and transportation ticket agent* is most often the first employee passengers meet after entering the airport. Ticket agents work at airport ticket counters and boarding gates and use computers to provide customer service to incoming passengers. They can make and confirm reservations, sell tickets, and issue boarding passes. They also may work in call centers, answering phone inquiries about flight schedules and fares, verifying reservations, issuing tickets, and handling payments. *Customer service representatives* assist passengers, check tickets when passengers board or disembark from an airplane, and check luggage at the reception area and ensure that it is placed on the proper carrier. They assist elderly or handicapped persons and unaccompanied children in claiming personal belongings and baggage, and in getting on and off the plane. They also may provide assistance to passengers who become ill or injured.

Other ground occupations include *airplane cargo agents*, who take orders from shippers and arrange for transportation of their goods. *Baggage handlers*, classified under *laborers and freight, stock, and material movers, hand* are responsible for loading and unloading passengers' baggage. They stack baggage on specified carts or conveyors to see that it gets to the proper destination and also return baggage to passengers at airline terminals. *Aircraft cleaners* clean aircraft interiors after each flight.

Flight crewmembers make up 31 percent of air transportation employment, and include pilots and flight attendants. *Airline pilots, copilots, and flight engineers* are highly trained professionals who fly and navigate jet and turboprop airplanes. Generally, the most experienced pilot, or captain, is in command and supervises all other crewmembers. The pilot and copilot split flying and other duties such as communicating with air traffic controllers and monitoring the instruments. Some aircraft have a third pilot in the cockpit—the *flight engineer* or second officer—who assists the other pilots by monitoring and operating many of the instruments and systems and watching for other aircraft. Most newer aircraft are designed to be flown without a flight engineer. Small aircraft and helicopters that transport passengers and cargo and perform activities such as crop dusting, monitoring traffic, firefighting, and rescue missions are flown and navigated by *commercial pilots*.

About 2 out of 3 jobs in air transportation are at the small number of establishments employing 1,000 or more workers

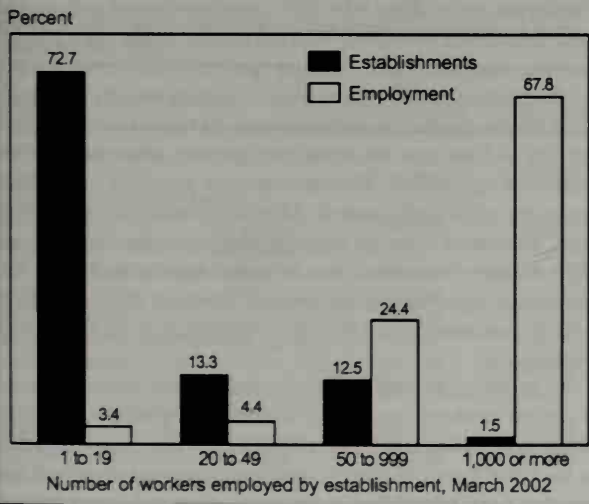


Table 1. Employment of wage and salary workers in air transportation by occupation, 2002 and projected change, 2002-12

(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	559	100.0	12.0
Management, business, and financial occupations	31	5.5	21.8
Top executives	3	0.5	25.7
Transportation, storage, and distribution managers	3	0.6	18.7
Training and development specialists	3	0.5	22.7
Professional and related occupations ..	15	2.7	20.4
Computer specialists	4	0.7	24.6
Aerospace engineers	3	0.5	15.7
Aerospace engineering and operations technicians	2	0.4	15.4
Service occupations	118	21.1	15.7
Baggage porters and bellhops	12	2.2	10.6
Flight attendants	97	17.4	15.9
Sales and related occupations	7	1.3	15.3
Office and administrative support occupations	192	34.3	5.4
First-line supervisors managers of office and administrative support workers ..	11	1.9	0.6
Bookkeeping, accounting, and auditing clerks	4	0.6	4.1
Customer service representatives	29	5.1	15.8
Reservation and transportation ticket agents and travel clerks	111	19.9	4.2
Cargo and freight agents	8	1.4	-0.1
Production, planning, and expediting clerks	4	0.7	17.4
Stock clerks and order fillers	5	0.9	-8.0
Secretaries and administrative assistants	4	0.8	0.9
Office clerks, general	4	0.6	8.4
Installation, maintenance, and repair occupations	80	14.2	10.1
First-line supervisors managers of mechanics, installers, and repairers ..	4	0.7	21.1
Avionics technicians	2	0.3	6.6
Aircraft mechanics and service technicians	55	9.9	7.9
All other vehicle and mobile equipment mechanics, installers, and repairers ..	7	1.2	8.3
Maintenance and repair workers, general	7	1.2	17.8
Transportation and material moving occupations	113	20.3	16.2
Aircraft cargo handling supervisors	2	0.4	14.6
Airline pilots, copilots, and flight engineers	67	11.9	18.4
Commercial pilots	7	1.3	26.4
Airfield operations specialists	1	0.2	23.3
Transportation inspectors	2	0.4	10.2
All other related transportation workers	5	0.9	17.8
Cleaners of vehicles and equipment	5	0.9	7.7
Laborers and freight, stock, and material movers, hand	9	1.7	-3.8
Material moving workers, all other	4	0.8	10.7

NOTE: May not add to totals due to omission of occupations with small employment.

Airline flights must have one or more *flight attendants* on board, depending on the number of passengers. Their most important function is assisting passengers in the event of an emergency. This may range from reassuring passengers during occasional encounters with strong turbulence to opening emergency exits and inflating escape chutes. More routinely, flight attendants instruct passengers in the use of safety and emergency equipment. Once in the air, they serve meals and snacks, answer questions about the flight, distribute magazines and pillows, and help to care for small children and elderly and disabled persons. They also may administer first aid to passengers who become ill.

The airline industry also relies on many management, professional, and administrative support workers to keep operations running smoothly.

Training and Advancement

The skills and experience needed by workers in the air transportation industry differ by occupation. Some jobs may be entered directly from high school, while others require extensive specialized training. Most positions in the airline industry involve extensive customer service contact requiring strong interpersonal and communication skills. Mechanics and pilots require extensive specialized formal training and must be certified by the FAA; skills for many other air transportation occupations can be learned on the job or through company-sponsored training.

Pilots must have a commercial pilot's license with an instrument rating, and must be certified to fly the types of aircraft that their employer operates. For example, helicopter pilots must hold a commercial pilot's certificate with a helicopter rating. Pilots receive their flight training from the military or from civilian flying schools. Physical requirements are strict. With or without glasses, pilots must have 20/20 vision and good hearing, and be in excellent health. In addition, airlines generally require 2 years of college and increasingly prefer or require a 4-year college degree. Pilots who work for smaller airlines may advance to flying for larger companies. They also can advance from flight engineer to copilot to captain and, by becoming certified, to fly larger planes.

Applicants for flight attendant jobs must be in excellent health. Employers prefer those who have completed some college and have experience in dealing with the public. Speaking a foreign language also is an asset. Airlines operate flight attendant training programs on a continuing basis. Training usually lasts from 4 to 8 weeks, depending on the size and the type of carrier. Training may include crew resource management, which emphasizes teamwork and safety. Courses also are provided in personal grooming and weight control. After completing initial training, flight attendants must go through additional training and pass an FAA safety exam each year in order to continue flying. Advancement opportunities are limited, although some attendants become customer service directors, instructors, or recruiting representatives.

When hiring aircraft mechanics, employers prefer graduates of aircraft mechanic trade schools who are in good physical condition. After being hired, aircraft mechanics must keep up to date on the latest technical changes and improvements in aircraft and associated systems. Most mechanics remain in the maintenance

field, but they may advance to head mechanic and, sometimes, to supervisor.

A good speaking voice and a pleasant personality are essential for reservation and transportation ticket agents and customer service representatives. Airlines prefer applicants with experience in sales or in dealing with the public and most require a high school education, but some college is preferred. Formal company training is required to learn how to operate airline computer systems, issue tickets, and plan trips. Some agents and service representatives advance to supervisor or other administrative positions.

Some entry-level jobs in this industry, such as baggage handler and aircraft cleaner, require little or no previous training. The basic tasks associated with many of these jobs are learned in less than a week, and most newly hired workers are trained on the job under the guidance of an experienced employee or a manager. However, promotional opportunities for many ground occupations are limited due to the narrow scope of the duties and the specialized skills of some occupations. Some may advance to supervisor or another administrative position.

Earnings

Most employees in the air transportation industry receive standard benefits, such as paid vacation and sick leave and life and health insurance, and often profit-sharing and retirement plans as well. Some airlines provide allowances to employees for purchasing and cleaning their company uniforms. A unique benefit—free or reduced-fare transportation for airline employees and their immediate families—attracts many jobseekers. Earnings in selected occupations in air transportation appear in table 2.

In 2002, about 45 percent of all workers in the air transportation industry were union members or were covered by union contracts, compared with 15 percent of all workers throughout the economy.

Outlook

Wage and salary jobs in the air transportation industry are projected to increase by 12 percent over the 2002-12 period, compared with 16 percent for all industries combined. However, job

opportunities may vary from year to year, because the demand for air travel—particularly pleasure travel, a discretionary expense—fluctuates with ups and downs in the economy. In the long run, passenger and cargo traffic is expected to continue expanding in response to increases in population, income, and business activity.

Despite a recent slowdown in passenger air travel, demographic and income trends indicate favorable conditions for leisure travel in the United States and abroad over the next decade. The aging of the population, in combination with growth of disposable income among the elderly, should increase the demand for air transportation services. Also, business travel should improve with the economy and as world trade expands, companies continue to go global, and the economies in many foreign countries become more robust. However, as businesses also try to reduce costs, they are resorting to cheaper alternatives to flying and finding new ways to communicate. Many business travelers are using other means of transportation, such as driving or using the railway system, or are conducting more business by phone, e-mail, or better quality and lower cost video-conferencing technologies.

Cargo traffic is expected to increase with the economy and growing world trade. It should also be stimulated by the development of global e-commerce and manufacturing trends such as just-in-time delivery, which requires more materials to be shipped rapidly.

Job opportunities in the air transportation industry are expected to vary depending on the occupation. Pilots and flight attendants are projected to experience average growth through 2012 as the economy and passenger traffic rebound from the severe downturn in the industry. In the near term, the best opportunities will be with the faster growing regional and low-fare carriers. Persons with a college degree, or former military pilots, can expect to have the best job prospects. Turnover of flight attendants will also produce job openings for this occupation as many leave for more stable work schedules or better salary.

The number of reservation and transportation ticket agents will grow more slowly than the average as airlines phase out paper tickets and move to electronic “ticketless” travel, and as more passengers purchase electronic tickets over the Internet. However, the safety and security responsibilities of these jobs will continue, preventing a decline in these jobs. Competition for ticket agent and customer service representative jobs will continue to be keen as many more people are likely to apply for these jobs than there are openings.

Opportunities should be excellent for aircraft and avionics equipment mechanics and service technicians. The likelihood of fewer entrants from the military and a larger number of retirements indicates excellent opportunities for students just beginning technician training.

Opportunities also are expected to be good among unskilled entry-level positions, such as baggage handler and aircraft cleaner, because many workers leave these jobs and need to be replaced.

Sources of Additional Information

Information about specific job opportunities and qualifications required by a particular airline may be obtained by writing to personnel managers of the airlines.

Table 2. Median annual earnings of the largest occupations in air transportation, 2002

Occupation	Air transportation	All industries
Airline pilots, copilots, and flight engineers	\$126,840	\$109,580
Aircraft mechanics and service technicians	48,050	43,070
First-line supervisors/managers of office and administrative support workers	45,500	38,820
Commercial pilots	44,890	47,970
Flight attendants	43,200	43,140
Maintenance and repair workers, general	40,610	29,370
Cargo and freight agents	31,140	31,410
Customer service representatives	28,370	26,240
Reservation and transportation ticket agents and travel clerks	27,420	25,350
Cleaners of vehicles and equipment	24,110	17,060
Laborers and freight, stock, and material movers, hand	23,890	19,710

Information on these key air transportation occupations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Aircraft and avionics equipment mechanics and service technicians

- Aircraft pilots and flight engineers
- Flight attendants
- Reservation and transportation ticket agents and travel clerks

Truck Transportation and Warehousing

(NAICS 484, 493)

SIGNIFICANT POINTS

- Truck drivers hold 44 percent of all jobs.
- Job opportunities are expected to be good for qualified truck drivers and service technicians.
- Business activity in the industry is prone to rise and fall with upswings and downturns in the economy.

Nature of the Industry

Firms in the truck transportation and warehousing industry provide a link between manufacturers and consumers. Businesses, and occasionally individuals, contract with trucking and warehousing companies to pick up, transport, store, and deliver a variety of goods. This industry includes three segments: general freight trucking; specialized freight trucking; and warehousing and storage.

General freight trucking provides over-the-road transportation of general commodities using motor vehicles, such as trucks and tractor trailers. This industry segment is further subdivided based on distance traveled and type of goods delivered. Local trucking establishments primarily carry goods within a single metropolitan area and its adjacent nonurban areas. Long-distance trucking establishments carry goods between distant areas.

Local trucking comprised 28,000 trucking establishments in 2002. The work of local trucking firms varies depending on the products transported. Produce truckers usually pick up loaded trucks early in the morning and spend the rest of the day delivering produce to many different grocery stores. Lumber truck drivers, on the other hand, make several trips from the lumber yard to one or more construction sites. Some local truck transportation firms also take on sales and customer relations responsibilities, in addition to delivering the firm's products. Some local trucking firms specialize in garbage collection and trash removal or hauling dirt and debris.

Long-distance trucking comprises establishments primarily engaged in providing long-distance trucking between distant areas and sometimes between the United States and Canada and Mexico. Numbering 41,000 establishments, these firms handle a wide variety of commodities.

Specialized freight trucking provides over-the-road transportation of freight, which, because of size, weight, shape, or other inherent characteristics, requires specialized equipment, such as flatbeds, tankers, or refrigerated trailers. This industry sector also includes the moving industry—that is, the transportation of used household, institutional, and commercial furniture. Like general freight trucking, specialized freight trucking is subdivided into local and long-distance subcomponents. The specialized freight trucking sector contained 45,000 establishments in 2002.

Some goods are carried across country using intermodal transportation to save time and money. Intermodal transportation

encompasses any combination of truck, train, plane, or ship. Typically, trucks perform at least one leg in the intermodal transportation of goods. For example, a shipment of cars from an assembly plant begins its journey when they are loaded onto rail cars. Next, trains haul the cars across country to a depot where the shipments are broken into smaller lots, loaded onto tractor-trailers, and sent off on the final leg of their journey to dealerships. Each of these steps is carefully orchestrated and timed so that the cars arrive just in time to be shipped on their next leg of their journey. Goods can be transported at lower cost this way, but they cannot be highly perishable—such as fresh produce—nor have strict delivery time schedules. Trucking still dominates the transportation of perishable and time-sensitive goods.

Warehousing and storage facilities comprised 13,000 establishments in 2002. These firms are primarily engaged in operating warehousing and storage facilities for general merchandise and refrigerated goods. They provide facilities to store goods; self-storage mini-warehouses that rent to the general public are also included in this segment of the industry.

Deregulation of interstate trucking in 1980 encouraged many firms to add a wide range of customer-oriented services to complement trucking and warehousing services and led to innovations in the distribution process. Increasingly, trucking and warehousing firms provide businesses full-service logistical services encompassing the entire transportation process, including inventory management, materials handling, and warehousing. Firms that offer these services are often referred to as third-party logistics providers. Logistical services manage all aspects of the movement of goods between producers and consumers, such as sorting bulk goods into customized lots, packaging and repackaging goods, inventory control and management, order entry and fulfillment, labeling, light assembly, and price marking. Logistical services such as computerized inventory information on the location, age, and quantity of goods available have improved the efficiency of relationships between manufacturers and customers. Many firms are increasingly relying on computer technology to expedite the distribution of good. Just-in-time shipping—where trucking companies deliver goods from suppliers just in time for their use—allows recipients to reduce costly inventories but requires constant communication and accurate inventory information. Packaging, labeling, and small assembly of manufacturers' products are other services that warehousing establishments use to attract poten-

tial customers. Some full-service companies even perform warranty repair work and serve as local parts distributors for manufacturers.

Working Conditions

In the truck transportation industry in 2002, workers averaged 39.7 hours a week, compared with an average of 38.5 hours in warehousing and storage, and 33.9 for all private industries.

The U.S. Department of Transportation governs work hours and other working conditions of truck drivers engaged in interstate commerce. For example, a long-distance driver generally cannot work more than 60 hours in any 7-day period. Many drivers, particularly on long runs, work close to the maximum time permitted because employers usually compensate them based on the number of miles or hours they drive. Drivers frequently travel at night, on holidays, and weekends to avoid traffic delays and to deliver cargo on time.

Truck drivers must cope with a variety of working conditions including variable weather and traffic conditions, boredom, and fatigue. Many truck drivers, however, enjoy the independence and lack of supervision found in long-distance driving. Local truck drivers often have regular routes or assignments that allow them to return home in the evenings.

Improvements in roads and trucks are reducing stress and increasing the efficiency of long-distance drivers. Many advanced trucks are equipped with refrigerators, televisions, and beds for the driver's convenience. Included in some of these state-of-the-art vehicles is a satellite link with the company headquarters. Drivers can get directions, weather reports, and other important communications in a matter of seconds. In the event of bad weather or mechanical problems, truckers can communicate with dispatchers to discuss delivery schedules and courses of action. Dispatchers can also track the location of the truck and monitor fuel consumption and engine performance.

Vehicle and mobile equipment mechanics, installers, and repairers usually work indoors, although they occasionally make repairs on the road. Minor cuts, burns, and bruises are common, but serious accidents can be avoided when the shop is kept clean and orderly and safety practices observed. Service technicians and mechanics handle greasy and dirty parts and may stand or lie in awkward positions to repair vehicles and equipment. They usually work in well-lighted, heated, and ventilated areas, but some shops are drafty and noisy.

Laborers, and hand freight, stock, and material movers usually work indoors, though they may do occasional work on trucks and forklifts outside. Some occasions warrant heavy lifting and other physical labor.

Safety is a major concern of the truck transportation and warehousing industry. The operation of trucks, lifts, and other technically advanced equipment can be dangerous without proper training and supervision. Efforts are underway to standardize the training programs to make drivers more efficient and effective truck operators. Truck drivers already must adhere to federally mandated certifications and regulations. Federal mandates require drivers to submit to drug and alcohol tests as a condition of employment and more employers require periodic checks while on the job.

In 2002, work-related injuries and illnesses in the trucking and warehousing industry averaged 7.0 per 100 full-time workers, higher than the 5.3-incidence rate for the entire private sector. About 3 out of 4 on-the-job fatalities in the truck transportation and warehousing industry resulted from motor vehicle accidents.

Employment

The truck transportation and warehousing industry provided 1.9 million wage and salary jobs in 2002. About 44 percent of the salaried jobs in the industry, or 810,000, were for truck drivers. Other transportation and material moving jobs numbered 417,000 and another 327,000 jobs were in various office and administrative support occupations. There were about 92,000 in management, business, and financial occupations; 55,000 vehicle and mobile equipment mechanics, installers, and repairers; and 43,000 sales and related workers. In addition to wage and salary workers, an estimated 255,000 workers in the industry were self-employed in 2002.

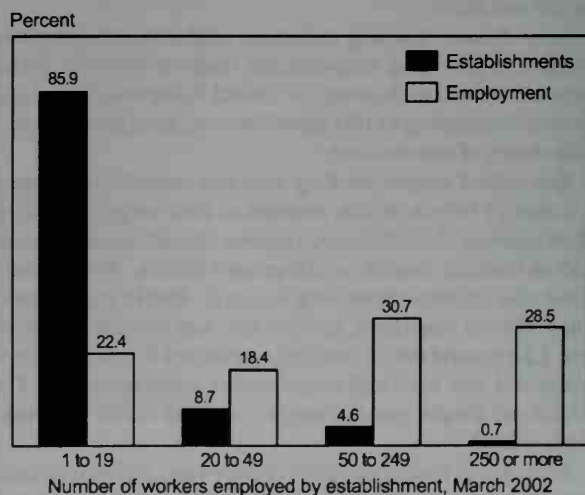
Most employees in the truck transportation and warehousing industry work in small establishments. Over 85 percent of trucking and warehousing establishments employ fewer than 20 workers (see chart). Consolidation in the industry has reduced the number of small, specialized firms. About 10 percent of truck drivers and driver/sales workers operate their own business. Although these owner-operators constantly enter the industry each year, intense competition has caused many to fail.

Trucking and warehousing establishments are found throughout the United States, with a higher concentration around the major interstate highways and in heavily industrialized regions of the country such as in California, New Jersey, and Texas.

Occupations in the Industry

Transportation and material moving occupations account for 66 percent of all jobs in the industry (table 1). *Truck drivers and*

More than 85 percent of the establishments in truck transportation and warehousing employ fewer than 20 workers



driver/sales workers, who hold 44 percent of all trucking and warehousing jobs, transport goods from one location to another. They ensure safe delivery of cargo to a specific destination, often by a designated time. Drivers also perform some minor maintenance work on their vehicles and make routine safety checks.

The length of trips varies according to the type of merchandise and its final destination. Local drivers provide regular service while other drivers make inter-city and interstate deliveries that take longer and may vary from job to job. The driver's responsibilities and assignments change according to the time spent on the road and the type of payloads transported.

Local drivers usually work more normal schedules and return home at the end of the day. They may deliver goods to stores or homes, or haul away dirt and debris from excavation sites. Many local drivers cover the same routes daily or weekly. Long-distance truck drivers often are on the road for long stretches of time. Their trips vary from an overnight stay to a week or more. On longer trips, drivers sometimes sleep in bunks in their cabs or share driving with another driver.

Laborers, and hand freight, stock, and material movers help load and unload freight and move it around warehouses and terminals. Often these unskilled employees work together in groups of three or four. They may use conveyor belts, hand trucks, or forklifts to move freight. They may place heavy or bulky items on wooden skids or pallets and have industrial truck and tractor operators move them.

Office and administrative support workers perform the daily recordkeeping operations for the truck transportation and warehousing industry. *Dispatchers* coordinate the movement of freight and trucks. They provide the main communication link that informs the truck drivers of their assignments, schedules, and routes. Often dispatchers receive new shipping orders on short notice and must juggle drivers' assignments and schedules to accommodate a client. *Shipping, receiving, and traffic clerks* keep records of shipments arriving and leaving. They verify the contents of trucks' cargo against shipping records. They may also pack and move stock. *Billing and posting clerks and machine operators* maintain company records of the shipping rates negotiated with customers and shipping charges incurred; they also prepare customer invoices.

Workers in installation, maintenance, and repair occupations generally enter these jobs only after acquiring experience in related jobs or after receiving specialized training. Most *vehicle and mobile equipment mechanics, installers, and repairers* require special vocational training. Service technicians and mechanics in trucking and warehousing firms perform preventive safety checks as well as routine service and repairs. Service technicians and mechanics sometimes advance to parts manager positions. *Parts managers* keep the supply of replacement parts needed to repair vehicles. Parts managers monitor the parts inventory using a computerized system, and purchase new parts to replenish supplies. These employees need mechanical knowledge and must be familiar with computers and purchasing procedures.

Sales and related workers sell trucking and warehousing services to shippers of goods. They meet with prospective buyers,

discuss the customer's needs, and suggest appropriate services. Travel may be required, and many analyze sales statistics, prepare reports, and handle some administrative duties.

Managerial staff provide general direction to the firm. They staff, supervise, and provide safety and other training to workers in the various occupations. They also resolve logistical problems such as forecasting the demand for transportation, mapping out the most efficient traffic routes, ordering parts and equipment service support, and planning the transportation of goods to the right place at the right time.

Table 1. Employment of wage and salary workers in truck transportation and warehousing by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,853	100.0	22.7
Management, business, and financial occupations	92	5.0	34.9
Top executives	35	1.9	30.6
Operations specialties managers	25	1.3	34.6
Business and financial operations occupations	23	1.2	38.6
Sales and related occupations	43	2.3	35.9
Office and administrative support occupations	327	17.6	16.8
Bookkeeping, accounting, and auditing clerks	21	1.1	13.3
Customer service representatives	24	1.3	36.7
Dispatchers, except police, fire, and ambulance	33	1.8	17.0
Shipping, receiving, and traffic clerks	36	1.9	18.8
Stock clerks and order fillers	53	2.9	13.1
Secretaries and administrative assistants	22	1.2	7.1
Office clerks, general	43	2.3	16.0
Installation, maintenance, and repair occupations	85	4.6	22.7
Vehicle and mobile equipment mechanics, installers, and repairers	55	2.9	14.5
Production occupations	36	1.9	40.9
Transportation and material moving occupations	1,226	66.2	21.9
First-line supervisors/managers of helpers, laborers, and material movers, hand	20	1.1	22.3
First-line supervisors/managers of transportation and material-moving machine and vehicle operators	33	1.8	19.9
Truck drivers, heavy and tractor-trailer	721	38.9	24.6
Truck drivers, light or delivery services	88	4.8	25.4
Laborers and freight, stock, and material movers, hand	195	10.6	8.4
Packers and packagers, hand	31	1.7	29.5

NOTE: May not add to totals due to omission of occupations with small employment.

Training and Advancement

Many jobs in the truck transportation and warehousing industry require only a high school education, although an increasing number of workers have at least some college education. Increased emphasis on formal education stems from increased complexity in the industry. Nearly all operations involve computers and information management systems. Many occupations require detail-oriented persons with computer skills. A growing number of employers recommend some form of formal training either in-house or through trade or union programs. Although the Federal Government does not mandate these programs, the trend is toward certification and standardized competency.

Whereas many States allow those who are 18 years old to drive trucks within State borders, the U.S. Department of Transportation establishes minimum qualifications for truck drivers engaged in interstate commerce. Federal Motor Carrier Safety Regulations require truck drivers to be at least 21 years old, have at least 20/40 vision and good hearing, and be able to read and speak English. They must also have good driving records. In addition, drivers must have a State commercial driver's license, for which they must pass a written examination and a skills test operating the type of vehicle they will be driving. Individual companies often have additional requirements applicants must meet.

Some truck drivers enter the occupation by attending training schools for truck drivers. Schools vary greatly in the quality of training they provide, but they are becoming more standardized. Many employers and some States support these programs.

Some large trucking companies have formal training programs that prospective drivers attend. Other companies assign experienced drivers to teach and mentor newer drivers. Local trucking firms often start drivers as truck driver helpers. As they gain experience and demonstrate their reliability, they receive assignments with greater earnings or preferred work schedules. Because of increased competition for experienced drivers, some larger companies lure these drivers with increased pay and preferred assignments. Some trucking firms hire only experienced drivers.

Some long-distance truck drivers purchase a truck and go into business for themselves. Although many of these owner-operators are successful, some fail to cover expenses and eventually go out of business. Owner-operators should have good business sense as well as truck driving experience. Courses in accounting, business, and business mathematics are helpful, and knowledge of truck mechanics can enable owner-operators to perform their own routine maintenance and minor repairs.

Unskilled employees may work as helpers, laborers, and material movers in their first job. They must be in good physical condition because the work often involves a great deal of physical labor and heavy lifting. They acquire skills on the job and often advance to more skilled jobs, such as industrial truck operator, truck driver, shipping and receiving clerk, or supervisor.

Office and administrative support jobs in the truck transportation and warehousing industry require good typing skills and familiarity with computers. Shipping and receiving clerks watch and learn the skills of the trade from more experienced workers while on the job. Stock clerks and truck drivers often ad-

vance to dispatcher positions after becoming familiar with company operations and procedures.

While some vehicle and mobile equipment mechanics, installers, and repairers learn the trade on the job, most employers prefer to hire graduates of programs in diesel mechanics offered by community and junior colleges or vocational and technical schools. Those with no training often start as helpers to mechanics, doing basic errands and chores such as washing trucks or moving them to different locations. Experience as an automotive service technician is helpful because many of the skills relate to diesel technology. Experienced technicians may advance to shop supervisor or parts manager positions.

For managerial jobs in the truck transportation and warehousing industry, employers prefer persons with bachelor's degrees in business, marketing, accounting, industrial relations, or economics. Good communication, problem-solving, and analytical skills are valuable in entry-level jobs. Since trucking and warehousing firms may rely heavily computer technology to aid in the distribution of goods, knowledge of information systems also is helpful for advancement. Although most managers must learn logistics through extensive training on the job, several universities offer graduate and undergraduate programs in logistics. These programs emphasize the tools necessary to manage the distribution of goods and are sometimes associated with the business departments of schools. Managers hired for entry-level positions sometimes advance to top level managerial jobs.

Some college graduates and persons without a college degree enter sales or administrative positions. Marketing and sales workers must be familiar with their firm's products and services and have strong communication skills.

Earnings

Average earnings in the truck transportation and warehousing industry are higher than the average for all private industry, as shown in table 2. The average wage in the trucking sector of the industry was higher than the average wage in warehousing. Earnings in selected occupations in truck transportation and warehousing appear in table 3.

Most employers compensate truck drivers with an hourly rate or a rate-per-mile system. Truck drivers who operate heavy tractor-trailers generally have higher earnings than those who drive light delivery trucks. Benefits, including performance related bonuses, health insurance, and sick and vacation leave are common in the trucking industry.

Table 2. Average earnings of nonsupervisory workers in truck transportation and warehousing, 2002

Industry segment	Weekly	Hourly
All private industry	\$506	\$14.95
Truck transportation	627	15.78
General freight trucking	652	16.19
Specialized freight trucking	562	14.69
Warehousing and storage	572	14.87
Refrigerated warehousing and storage	662	16.37
Miscellaneous warehousing and storage ..	578	15.35
General warehousing and storage	563	14.66

The major union in the truck transportation and warehousing industry is the International Brotherhood of Teamsters. About 13 percent of trucking and warehousing workers are union members or are covered by union contracts, compared to about 15 percent of workers in all industries combined. Some trucking companies use "double breasting" in an attempt to lower labor costs. This involves employing union as well as nonunion operating divisions. Other companies use multi-tier wage scales and pay lower wages for new hires. Pay increases after predetermined periods and safe driving records.

Outlook

The number of wage and salary jobs in the truck transportation and warehousing industry is expected to grow 23 percent from 2002 through 2012, compared with projected growth of 16 percent for all industries combined. Because the industry is large, many job openings will result—not only from employment growth—but also from the need to replace the large number of workers who transfer to other industries or retire. Opportunities in this industry should be good for qualified workers at all levels, especially for truck drivers and diesel service technicians and mechanics.

One of the main factors influencing the growth of the truck transportation and warehousing industry is the state of the national economy. Growth in the industry parallels economic upswings and downturns. As the national economy grows, production and sales of goods increase, thus increasing demand for transportation services to move goods from producers to consumers. In a recession, this industry is one of the first to slow down as orders for goods and shipments decline. Competition in the truck transportation and warehousing industry is intense, both among trucking companies and, in some long-haul truckload segments, with the railroad industry. Nevertheless, truck-

ing has been accounting for an increasing share of freight transportation revenue.

Additional employment growth will result from manufacturers' willingness to concentrate more on their core competencies—producing goods—and outsource their distribution functions to trucking and warehousing companies. As firms in other industries increasingly employ this industry's logistical services, such as inventory management and just-in-time shipping, many new jobs will be created. Also, the expansion of electronic commerce, as more consumers and businesses make purchases over the Internet, will continue to increase demand for the transportation and logistical services of the truck transportation and warehousing industry.

Opportunities for qualified truck drivers are expected to be favorable. In some areas, companies have experienced difficulties recruiting adequately skilled drivers. Truck driving pays relatively well, but many persons leave the career because of the lengthy periods away from home, long hours of driving, and the negative public image drivers face. Employment opportunities should be more plentiful with truckload carriers than with less-than-truckload (LTL) carriers because many workers prefer the working conditions of LTL carriers. Stricter requirements for obtaining—and keeping—a commercial driver's license also make truck driving a less attractive career. Opportunities for diesel service technicians and mechanics also are expected to be favorable, especially for applicants with formal postsecondary training.

Growth in the truck transportation and warehousing industry should prompt an increase in office and administrative support employment. More dispatchers, stock clerks, and shipping, receiving, and traffic clerks will be needed to support expanded logistical services across the country. However, fewer secretaries, bookkeepers, and file clerks will be needed because computers and other automated equipment will make workers in these occupations more efficient and productive.

Table 3. Median hourly earnings of the largest occupations in truck transportation and warehousing, 2002

Occupation	Truck transportation	Warehousing and storage	All industries
General and operations managers	\$28.89	\$33.43	\$32.80
First-line supervisors/managers of transportation and material-moving machine and vehicle operators	21.40	18.35	20.63
Truck drivers, heavy and tractor-trailer	17.10	16.17	15.97
Dispatchers, except police, fire, and ambulance	16.72	15.01	14.56
Bus and truck mechanics and diesel engine specialists	15.49	17.56	16.53
Industrial truck and tractor operators	14.29	12.07	12.54
Customer service representatives	13.46	12.44	12.62
Bookkeeping, accounting, and auditing clerks	12.53	13.36	13.16
Laborers and freight, stock, and material movers, hand	11.46	10.87	9.48
Office clerks, general	11.11	11.23	10.71
Secretaries, except legal, medical, and executive	10.29	11.89	12.16

Sources of Additional Information

For additional information about careers and training in the truck transportation and warehousing industry, write to:

- American Trucking Associations, 2200 Mill Rd., Alexandria, VA 22314.
- International Warehouse Logistics Association, 2800 River Rd., Suite 260, Des Plaines, IL 60018.
- International Association of Refrigerated Warehouses, 1500 King St., Suite 201, Alexandria, VA 22314.
- Professional Truck Driver Institute, 2200 Mill Rd., Alexandria, VA 22314. Telephone: (703) 838-8842. Internet: <http://www.ptdi.org>

Detailed information on the following occupations can be found in the 2004-05 *Occupational Outlook Handbook*:

- Diesel service technicians and mechanics
- Dispatchers
- Material moving occupations
- Shipping, receiving, and traffic clerks
- Truck drivers and driver/sales workers

SIGNIFICANT POINTS

- Persons with college training in advanced technology will have the best opportunities.
- Employment in water and sewage systems is projected to grow, while other segments of the industry are projected to decline.
- Because the utilities industry consists of many different companies and products, skills developed in one segment of the industry may not be transferable to other segments.
- Production workers' earnings are significantly higher than in most other industries.

Nature of the Industry

The simple act of walking into a restroom, turning on the light, and washing your hands, uses the products of perhaps four different utilities. Electricity powers the light, water supply systems provide water for washing, wastewater treatment plants treat the sewage, and natural gas or electricity heats the water. Some government establishments do the same work and employ a significant number of workers; however, information about them is not included in this statement. Information concerning government employment in utilities is included in the *Career Guide to Industries* statements on Federal Government and State and local government, except education and health. Each of the various segments within the utilities sector is distinctly different.

Electric power generation, transmission, and distribution. This segment includes firms engaged in the generation, transmission, and distribution of electric power. Electric plants harness highly pressurized steam or some force of nature to spin the blades of a turbine, which is attached to an electric generator. Coal is by far the dominant fuel used to generate steam in electric power plants, followed by nuclear power, natural gas, petroleum, and other energy sources. Hydroelectric generators are powered by the release of the tremendous pressure of water existing at the bottom of a dam or near a waterfall. Scientists also are conducting considerable research into renewable sources of electric power—geothermal, wind, and solar energy.

Legislative changes and industry competition have created new classes of firms that generate and sell electricity. Some industrial plants have their own electricity generating facilities, capable of producing more power than they require. Those that sell their excess power to utilities or to other industrial plants are called nonutility generators (NUGs). A type of NUG, termed an independent power producer, is an electricity generating plant designed to take advantage of both industry deregulation and the latest generating technology to compete directly with utilities for industrial and other wholesale customers.

Transmission or high voltage lines supported by huge towers connect generating plants with industrial customers and substations. At substations, the electricity's voltage is reduced and made available for household and small business use via distribution lines, which usually are carried by telephone poles.

Natural gas distribution. Natural gas, a clear odorless gas, is found underground, often near or associated with crude oil reserves. Exploration and extraction of natural gas is part of the oil and gas extraction industry, covered elsewhere in the *Career Guide to Industries*. Once found and brought to the surface, it is transported throughout the United States, Canada, and Mexico by gas transmission companies using pressurized pipelines. Local distribution companies take natural gas from the pipeline, depressurize it, add its odor, and operate the system that delivers the gas from transmission pipelines to industrial, residential, and commercial customers. Industrial customers, such as chemical and paper manufacturing firms, account for nearly half of natural gas consumption. Residential customers who use gas for heating and cooking, electric utilities, and commercial businesses—such as hospitals and restaurants—account for most of the remaining consumption.

Water, sewage, and other systems. Water utilities provide about 100 gallons of fresh, treated water every day for each person in this country, or close to 40 billion gallons per day nationwide. Water is collected from various sources such as rivers, lakes, and wells. After collection, water is filtered, treated, and sold for residential, industrial, agricultural, commercial, and public use. Depending on the population served by the water system, the utility may be a small plant in a rural area that requires the occasional monitoring of a single operator or a huge system of reservoirs, dams, pipelines, and treatment plants, requiring the coordinated efforts of hundreds of people. Sewage treatment facilities operate sewer systems or plants that collect, treat, and dispose of waste from homes and industries. Other utilities include steam and air-conditioning supply utilities, which produce and sell steam, heated air, and cooled air.

Utilities and the services they provide are so vital to everyday life that they are considered "public goods" and are typically heavily regulated. Formerly, utility companies operated as "regulated monopolies," meaning that in return for having no competition, they were subject to control by public utility commissions that ensured utilities acted in the public interest and regulated the rates they were allowed to charge. However, legislative changes in recent years have established and promoted competition in the utilities industry. The electric utilities industry, for

example, is currently restructuring in an effort to promote efficiency, lower costs to customers, and provide users with an increased number of service options.

Many utility companies are municipally owned. For example, of the roughly 2,000 gas distribution companies in the United States, about 1,000 are municipally owned. In general, utilities serving large cities have sufficient numbers of customers to justify the large expenditures necessary for building plants, and are operated by private, investor-owned companies. In rural areas, where the small number of customers in need of services would not provide an adequate return for private investors, the State or local government funds the plant construction and operates the utility.

The various segments of the utilities industry vary in the degree to which their workers are involved in production activities, administration and management, or research and development. Industries such as water supply that employ relatively few workers employ more production workers and plant operators. On the other hand, electric utilities generally operate larger plants using very expensive, high technology equipment, and thus employ more professional and technical personnel.

A unique feature of the utilities industry is that urban areas with many inhabitants generally have relatively few utility companies. For instance, there were about 53,400 community water systems in the United States in 2002 serving almost 268 million people. The 45,000 small water systems served only 25 million people while the 8,400 largest systems served more than 242 million. Alaska, with a 2002 population about 10 percent of that of Massachusetts, had about 3 times more electric generating plants than Massachusetts. These examples show that economies of scale in the utilities industry allow one or two large companies to serve large numbers of customers in metropolitan areas more efficiently than many smaller companies. In fact, some utility companies, predominately serving large metropolitan areas, offer more than one utility to their customers.

Unlike most industries, the utilities industry imports and exports only a small portion of its product. In the natural gas industry, for example, this reflects the fact that the country has a sizable, proven resource base that can be used economically to meet the country's needs. This is the result of a National policy that utilities should be self-sufficient, without dependence on imports for the basic services our country requires. However, easing trade restrictions, increased pipeline capacity, and shipping natural gas in liquefied form have made importing and exporting natural gas more economical. In 2002, about 18 percent of the natural gas consumed was imported, mostly from Canada. A small portion of natural gas is exported in liquefied form, primarily to Japan.

Working Conditions

Electricity, gas, and water are produced and used continuously throughout each day. As a result, split, weekend, and night shifts are common for utility workers. The average workweek for production workers in utilities was 40.9 hours in 2002, compared with 33.6 hours for all trade, transportation, and utilities industries,

and 33.9 hours for all private industries. Employees often must work overtime to accommodate peaks in demand and to repair damage caused by storms, cold weather, accidents, and other occurrences. The industry employs relatively few part-time workers.

The hazards of working with electricity, natural gas, treatment chemicals, and wastes can be substantial, but generally are avoided by following rigorous safety procedures. Protective gear such as rubber gloves with long sleeves, nonsparking maintenance equipment, and body suits with breathing devices designed to filter out any harmful fumes are mandatory for work in dangerous environs. Employees also undergo extensive training on working with hazardous materials and utility company safety measures.

In 2002, the utilities industry reported 5.0 cases of work-related injury or illness per 100 full-time workers, compared with an average of 5.3 cases for all private industries, and 7.2 cases for manufacturing industries.

Employment

Utilities employed about 600,000 workers in 2002. Electric power generation, transmission, and distribution provided almost 3 in 4 jobs, as shown in table 1.

Table 1. Distribution of wage and salary employment in nongovernment utilities, 2002
(Employment in thousands)

Industry	Employment	Percent
Total, all utilities	600	100.0
Electric power generation, transmission, and distribution	436	72.6
Natural gas distribution	116	19.3
Water, sewage, and other systems	48	8.1

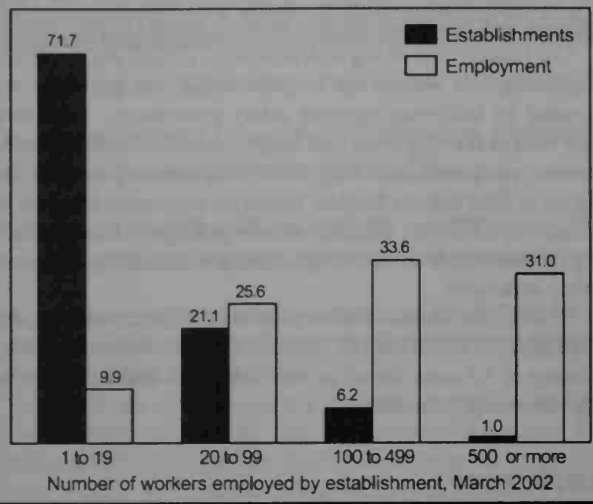
The diversity of production processes in the utilities industry was reflected in the size of the establishments that made up the industry. For example, the electric power and natural gas distribution sectors consisted of relatively large plants. In 2002, electric power generation, transmission, and distribution plants employed an average of about 55 workers per establishment. On the other hand, the water, sewage, and other systems sector employed an average of only 8 workers per establishment (table 2).

Table 2. Nongovernment establishments in utilities and average employment per establishment, 2002

Industry	Number of establishments	Employment per establishment
Total, all utilities	16,400	36
Electric power generation, transmission, and distribution	7,800	55
Natural gas distribution	2,900	39
Water, sewage, and other systems	5,600	8

Most utilities jobs are in establishments employing 100 or more workers

Percent



Although many establishments are small, most utilities jobs were in establishments with 100 or more workers (see chart).

Occupations in the Industry

About 227,000 jobs—almost 38 percent of all wage and salary jobs in the utilities industry—were in production or installation, maintenance, and repair occupations (table 3). About 23 percent of jobs were in office and administrative support occupations; almost 14 percent were in professional and related occupations; and about 13 percent were in management, business, and financial occupations. The remaining jobs were in construction, transportation, sales, and service occupations.

Workers in production and installation, maintenance, and repair occupations install and maintain pipelines and powerlines, operate and fix plant machinery, and monitor treatment processes. For example, *electrical powerline installers and repairers* install and repair cables or wires used in electrical power or distribution systems. They install insulators, wooden poles, and light-duty or heavy-duty transmission towers. *First-line supervisors and managers* directly supervise and coordinate the activities of production and repair workers. These supervisors ensure that workers use and maintain equipment and materials properly and efficiently to maximize productivity.

Production occupations include *power plant operators*, *power distributors and dispatchers*, and *water and liquid waste treatment plant operators*. *Power plant operators* control or operate machinery, such as stream-driven turbine generators, to generate electric power, often using control boards or semi-automatic equipment. *Power distributors and dispatchers* coordinate, regulate, or distribute electricity or steam in generating stations, over transmission lines to substations, and over electric power lines. *Water and liquid waste treatment plant and system operators* control the process of treating water or wastewater, take samples

of water for testing, and may perform maintenance of treatment plants.

Industrial machinery mechanics install, repair, and maintain machinery in power generating stations, gas plants, and water treatment plants. They repair and maintain the mechanical components of generators, waterwheels, water-inlet controls, and piping in generating stations; steam boilers, condensers, pumps, compressors, and similar equipment in gas manufacturing plants; and equipment used to process and distribute water for public and industrial uses.

General maintenance and repair workers perform work involving a variety of maintenance skills to keep machines, mechanical equipment, and the structure of an establishment in repair. Generally found in small establishments, these workers have duties that may involve pipefitting, boilermaking, electrical work, carpentry, welding, and installing new equipment.

Office and administrative support occupations account for about a quarter of jobs in the utilities industry. *Customer service representatives* interview applicants for water, gas, and electric service. They talk with customers by phone or in person and receive orders for installation, turn-on, discontinuance, or change in service. *General office clerks* may do bookkeeping, typing, stenography, office machine operation, and filing. *Utilities meter readers* read electric, gas, water, or steam consumption meters visually or remotely using radio transmitters and record the volume used by residential and industrial customers. Financial clerks, such as *bookkeeping, accounting, and auditing clerks*, compute, classify, and record numerical data to keep financial records complete. They perform any combination of routine calculating, posting, and verifying duties to obtain primary financial data for use in maintaining accounting records.

Professional and related occupations in this industry include *engineers* and *computer specialists*. *Engineers* develop technologies that allow, for example, utilities to produce and transmit gas and electricity more efficiently and water more cleanly. They also may develop improved methods of landfill or wastewater treatment operations in order to maintain compliance with government regulations. *Computer specialists* develop computer systems to automate utility processes; provide plant simulators for operator training; and improve operator decision making. *Engineering technicians* assist engineers in research activities and may conduct some research independently.

Managers and administrators in the utilities industry plan, organize, direct, and coordinate management activities. They often are responsible for maintaining an adequate supply of electricity, gas, water, steam, or sanitation service.

Training and Advancement

Utilities provide career opportunities for persons with varying levels of experience and education. However, because the utilities industry consists of many different companies and products, skills developed in one segment of the industry may not be transferable to other segments.

High school graduates qualify for most entry-level production jobs. Production workers may start as laborers or in other unskilled jobs and, by going through an apprenticeship program and gaining on-the-job experience, advance into better-paying positions that require greater skills or have greater responsibility.

Table 3. Employment of wage and salary workers in utilities by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	600	100.0	-5.7
Management, business, and financial occupations	79	13.2	-3.4
Top executives	13	2.2	-0.1
Engineering managers	4	0.7	-4.4
Accountants and auditors	8	1.4	-4.9
Professional and related occupations	83	13.9	-4.9
Computer specialists	17	2.8	-1.0
Electrical and electronics engineers	9	1.4	-10.9
Nuclear engineers	7	1.2	-9.0
Electrical and electronic engineering technicians	8	1.3	-6.4
Nuclear technicians	3	0.5	-15.0
Service occupations	8	1.3	-7.8
Sales and related occupations	9	1.5	-9.4
Office and administrative support occupations	139	23.2	-15.7
Bookkeeping, accounting, and auditing clerks	7	1.2	-12.6
Customer service representatives	37	6.1	-7.1
Meter readers, utilities	23	3.8	-22.3
Secretaries and administrative assistants	16	2.7	-17.6
Office clerks, general	13	2.2	-15.0
Construction and extraction occupations	40	6.6	0.9
Electricians	10	1.6	3.8
Plumbers, pipefitters, and steamfitters	11	1.8	-1.4
Installation, maintenance, and repair occupations	153	25.6	-4.8
First-line supervisors/managers of mechanics, installers, and repairers	16	2.7	-4.6
Electrical and electronics repairers, powerhouse, substation, and relay	14	2.3	-6.1
Control and valve installers and repairers, except mechanical door	18	3.0	-1.4
Industrial machinery mechanics	10	1.6	1.8
Maintenance and repair workers, general	11	1.8	2.0
Electrical power-line installers and repairers	55	9.2	-6.2
Production occupations	74	12.3	4.9
First-line supervisors/managers of production and operating workers	12	2.0	-0.7
Nuclear power reactor operators	3	0.5	-5.4
Power distributors and dispatchers	5	0.9	-5.9
Power plant operators	22	3.6	-5.4
Water and liquid waste treatment plant and system operators	9	1.5	67.8
Gas plant operators	5	0.8	8.3
Transportation and material moving occupations	14	2.3	-8.0
Laborers and freight, stock, and material movers, hand	3	0.5	-17

NOTE: May not add to totals due to omission of occupations with small employment.

ity. Substantial advancement is possible even within a single occupation. For example, power plant operators may move up through several levels of responsibility until they reach the highest-paying operator jobs. Advancement in production occupations generally requires mastery of advanced skills on the job, usually with some formal training provided by the employer or through additional vocational training at a 2-year technical college. Additional formal education from an outside source is sometimes needed.

Most computer, engineering, and technician jobs require technical education after high school, although opportunities exist for persons with degrees ranging from an associate degree to a doctorate. These workers are usually familiar with company objectives and production methods which, combined with college education, equip them with many of the tools necessary for advancement to management positions. Graduates of 2-year technical institutes usually fill technician positions. Sometimes, graduates of engineering programs will start as technicians until an opportunity to advance into an engineering position arises.

Managerial jobs generally require a 4-year college degree, although a 2-year technical degree may be sufficient in smaller plants. Managers usually can advance into higher-level management jobs without additional formal training outside the workplace. Competition is expected to be keen for management positions, as industry restructuring is forcing utility companies to shed excess layers of management to improve productivity and competitiveness in the new deregulated environment.

Earnings

Overall, production workers in the utilities industry had average weekly earnings of \$978 in 2002. Earnings varied by industry segment within utilities (table 4). Average weekly earnings for production workers were highest in natural gas distribution (\$1,009) and electric power generation, transmission, and distribution (\$1,000); and lowest in water, sewage, and other systems (\$689).

Table 4. Average earnings and hours of production workers in nongovernment utilities by industry segment, 2002

Industry segment	Earnings		Weekly hours
	Weekly	Hourly	
Total, private industry	\$506	\$14.95	33.9
Nongovernment utilities	978	23.94	40.9
Natural gas distribution	1,009	23.58	42.8
Electric power generation, transmission, and distribution	1,000	24.56	40.7
Water, sewage, and other systems	689	18.67	36.9

Earnings in utilities were generally higher than earnings in other industries. The hourly earnings for production workers in utilities averaged \$23.94 in 2002, compared with \$14.95 in all private industry. This was due in part to more overtime and weekend work—as utility plant operations must be monitored 24 hours a day—which commands higher hourly rates. Earnings in selected occupations in utilities appear in table 5.

In 2002, almost a third of workers in utilities were union members or covered by union contracts, more than double the proportion for all industries.

Table 5. Median hourly earnings of the largest occupations in utilities, 2002

Occupation	Utilities	All industries
General and operations managers	\$41.58	\$32.80
First-line supervisors/managers of production and operating workers	34.01	20.64
First-line supervisors/managers of mechanics, installers, and repairers	31.45	22.87
Electrical and electronics repairers, powerhouse, substation, and relay	25.66	24.85
Power plant operators	25.20	24.00
Electrical power-line installers and repairers ..	24.98	23.33
Control and valve installers and repairers, except mechanical door	24.41	20.90
Customer service representatives	17.07	12.62
Meter readers, utilities	16.06	13.86
Office clerks, general	15.77	10.71

Outlook

Wage and salary employment in utilities is expected to decline 6 percent between 2002 and 2012, compared with an increase of about 16 percent for all industries combined. Projected employment change varies by industry segment, as shown in table 6. Although electric power and natural gas are essential to everyday life, employment declines will result from improved production methods and technology, energy conservation by consumers and more efficient appliances, and a more competitive regulatory environment.

Table 6. Projected employment growth in nongovernment utilities by industry segment, 2002-12

Industry segment	Percent change
Total, all nongovernment utilities	-5.7
Electric power generation, transmission, and distribution	-7.1
Natural gas distribution	-22.4
Water, sewage, and other systems	46.4

Reorganization of electric and gas utilities has increased competition and provided incentives for improved efficiency. For example, nonutility generators of electricity, such as a major industrial plant operating its own power generators, are permitted to sell their excess electricity to utilities at competitive rates. Also, independent power producers can build electric power generating plants for the sole purpose of selling their power to utilities. These producers generally build gas-turbine generating plants, which have lower construction and environmental costs, employ fewer workers, and usually can sell electric power more cheaply than the coal-powered steam-turbine generator plants.

In the gas transmission and distribution industry, regulatory changes now allow wholesale buyers to purchase gas at competitive rates from any producer and to use the gas pipeline transmission network to transport the gas. This process also is occurring at the distribution level. These changes have caused an increase in gas and electric utility mergers, workforce reductions, and the redesign and reallocation of job duties in a process that will continue through the 2002-12 projection period.

New and continuing energy policies also provide investment tax credits for research and development of renewable sources of energy and ways to improve the efficiency of equipment used in electric utilities. As a result, electric utilities will continue to increase the productivity of their plants and workers, resulting in a slowdown in employment opportunities. However, highly trained technical personnel with the education and experience to take advantage of new developments in electric utilities should face good prospects for employment.

In the water and sewage systems industries, regulatory changes have had the opposite impact. Regulations in these industries have not been designed to increase competition, but to increase the number of contaminants that must be monitored and treated and to tighten the environmental impact standards of these industries, resulting in increased employment.

Water and sewage systems services are projected to be the only growing segment of utilities, with employment projected to increase 46 percent from 2002 to 2012. This segment is expected to grow as a result of an increase in the amount of waste generated from a growing population. Also, newly constructed housing developments are more likely to have community water supplies and waste treatment facilities, increasing demand for these services.

Technology and automation will adversely affect natural gas distribution utilities employment. Although natural gas is an increasingly popular choice among homeowners, businesses, and electric utilities, the efficiency of natural gas furnaces has increased considerably, thereby reducing average home consumption. These energy-conserving technologies will likely continue to minimize the relative use of natural gas by most industries and by individual homes. In addition, utilities in colder climates have increasingly automated their meter reading and billing procedures. Combined, these developments are projected to result in a decrease in employment in natural gas distribution services.

In general, persons with college training in advanced technology will have the best opportunities in utilities industries. Computer systems analysts and network systems and data communications analysts are expected to be among the fastest growing occupations in the professional and related occupations group, as plants emphasize automation and productivity. Some office and administrative support workers, such as utilities meter readers and bookkeeping, accounting, and auditing clerks, are among those affected by increasing automation. Technologies including radio-transmitted meter reading and computerized billing procedures are expected to decrease employment.

Sources of Additional Information

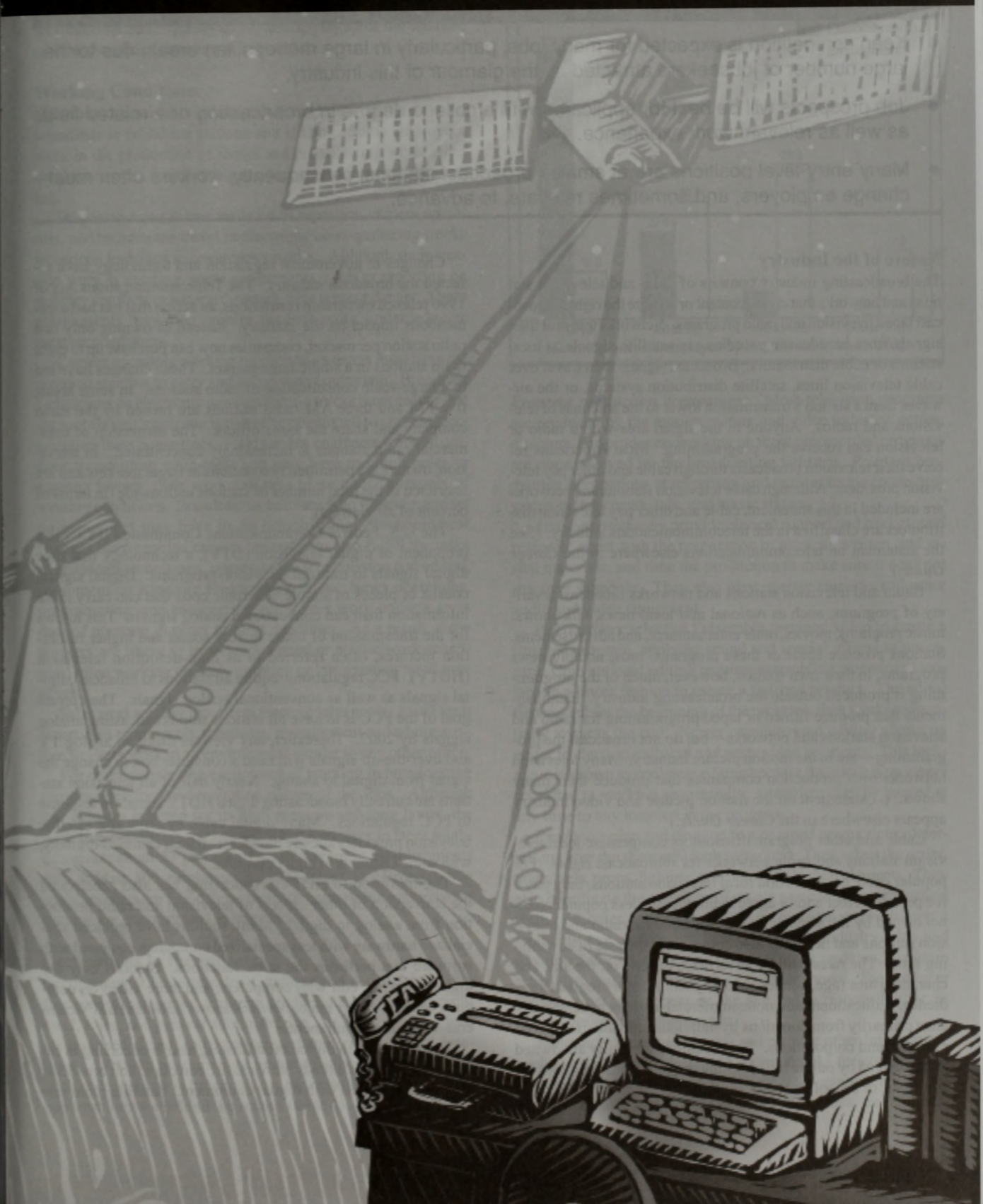
General information on the utilities industry and employment opportunities is available from local utilities and from:

- American Water Works Association, 6666 West Quincy, Denver, CO 80235. Internet: <http://www.awwa.org>
- International Brotherhood of Electrical Workers, 1125 15th St. NW., Washington, DC 20005.
- American Public Gas Association, 11094-D Lee Hwy., Suite 102, Fairfax, VA 22030. Internet: <http://www.apga.org>

- American Public Power Association, 2301 M St. NW.,
Washington, DC 20037-1484.
Internet: <http://www.appanet.org>

Detailed information on many key occupations in the utilities industry, including the following, may be found in the 2004-05 edition of the *Occupational Outlook Handbook*.

- Computer systems analysts, database administrators, and computer scientists
- Construction laborers
- Electrical and electronics engineers, except computer
- Engineering technicians
- Industrial machinery installation, repair, and maintenance workers, except millwrights
- Line installers and repairers
- Nuclear engineers
- Power plant operators, distributors, and dispatchers
- Stationary engineers and boiler operators
- Water and liquid waste treatment plant and system operators



SIGNIFICANT POINTS

- Keen competition is expected for many jobs, particularly in large metropolitan areas, due to the large number of jobseekers attracted by the glamour of this industry.
- Job prospects will be best for applicants with a college degree in broadcasting or a related field, as well as relevant work experience.
- Many entry-level positions are at smaller broadcast stations; consequently, workers often must change employers, and sometimes relocate, to advance.

Nature of the Industry

The broadcasting industry consists of radio and television stations and networks that create content or acquire the right to broadcast taped television and radio programs. Networks transmit their signals from broadcasting studios via satellite signals to local stations or cable distributors. Broadcast signals then travel over cable television lines, satellite distribution systems, or the airwaves from a station's transmission tower to the antennas of televisions and radios. Anyone in the signal area with a radio or television can receive the programming. Most Americans receive their television broadcasts through cable and other pay television providers. Although cable television stations and networks are included in this statement, cable and other pay television distributors are classified in the telecommunications industry. (See the statement on telecommunications elsewhere in the *Career Guide*.)

Radio and television stations and networks broadcast a variety of programs, such as national and local news, talk shows, music programs, movies, other entertainment, and advertisements. Stations produce some of these programs, most notably news programs, in their own studios; however, much of the programming is produced outside the broadcasting industry. Establishments that produce filmed or taped programming for radio and television stations and networks—but do not broadcast the programming—are in the motion picture industry. Many television networks own production companies that produce their many shows. (A statement on the motion picture and video industry appears elsewhere in the *Career Guide*.)

Cable and other program distributors compensate local television stations and cable networks for rebroadcast rights. For popular cable networks and local television stations, they pay a fee per subscriber and/or agree to broadcast a less popular channel owned by the same network. Revenue for radio and television stations and networks also comes from the sale of advertising time. The rates paid by advertisers depend on the size and characteristics (age, gender, median income) of a program's audience. Educational and noncommercial stations generate revenue primarily from donations by individuals, foundations, government, and corporations. These stations generally are owned and managed by public broadcasting organizations, religious institutions, or school systems.

Changes in government regulation and technology have affected the broadcast industry. The Telecommunications Act of 1996 relaxed ownership restrictions, an action that has had a tremendous impact on the industry. Instead of owning only one radio station per market, companies now can purchase up to eight radio stations in a single large market. These changes have led to a large-scale consolidation of radio stations. In some areas, five FM and three AM radio stations are owned by the same company and share the same offices. The ownership of commercial radio stations is increasingly concentrated. In television, owners are permitted two stations in larger markets and are restricted in the total number of stations nationwide (in terms of percent of all viewers).

The U.S. Federal Communications Commission (FCC) is a proponent of digital television (DTV), a technology that uses digital signals to transmit television programs. Digital signals consist of pieces of simple electronic code that can carry more information than can conventional analog signals. This allows for the transmission of better quality sound and higher resolution pictures, often referred to as high-definition television (HDTV). FCC regulations require all stations to broadcast digital signals as well as conventional analog signals. The current goal of the FCC is to have all stations stop broadcasting analog signals by 2007. Thereafter, any viewers using an analog TV and over-the-air signals will need a converter box to change the signal from digital to analog. Nearly half of all television stations are currently broadcasting digital HDTV signals in response to FCC regulations. Many digital cable systems and satellite television providers already broadcast all their channels digitally, with some channels in high definition.

The transition to HDTV broadcasting has also accelerated the conversion of other aspects of television and radio production from analog to digital. Many stations have replaced specialized hardware with less specialized computers equipped with software that performs the same functions. Stations may use digital cameras, edit with computers, and store video on computer servers. Many major network shows now use HDTV cameras and editing equipment.

The transition to digital broadcasting also is occurring in radio. Most stations already store music, edit clips, and broadcast their analog signals with digital equipment. Satellite radio ser-

vices, which offer 100 channels of digital sound, operate on a subscription basis like pay television services. To compete, radio stations are beginning to embed a digital signal into their analog signals. With a specially equipped radio, these digital services offer better quality sound and display some limited text, such as the title of the song and the artist.

Working Conditions

Most employees in this industry work in clean, comfortable surroundings in broadcast stations and studios. Some employees work in the production of shows and broadcasting while other employees work in advertising, sales, promotions, and marketing.

Television news teams made up of reporters, camera operators, and technicians travel in electronic news-gathering trucks to various locations to cover news stories. Although such location work is exciting, some assignments, such as reporting on military conflicts or natural disasters, may present danger. These assignments may also require outdoor work under adverse weather conditions.

Camera operators working on such news teams must have the physical stamina to carry and set up their equipment. Broadcast technicians on electronic news-gathering trucks must ensure that the mobile unit's antenna is correctly positioned to prevent electrocution from powerlines. Field service engineers work on outdoor transmitting equipment and may have to climb poles or antenna towers; their work can take place under a variety of weather conditions. Broadcast technicians who maintain and set up equipment may have to do heavy lifting. Technological changes have enabled camera operators to also fulfill the tasks of broadcast technicians, operating the transmission and editing equipment on a remote broadcasting truck. News operations, programming, and engineering employees work under a great deal of pressure in order to meet deadlines. As a result, these workers are likely to experience varied or erratic work schedules, often working on early morning or late evening news programs.

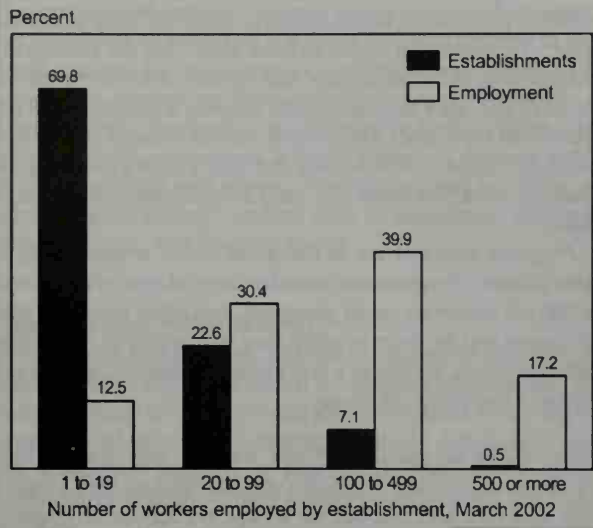
Sales workers may face stress meeting sales goals. Aside from sometimes erratic work schedules, management and administrative workers work in an environment similar to any other office.

For many people, the excitement of working in broadcasting compensates for the demanding nature of the jobs. Although this industry is noted for its high pressure and long hours, the work is generally not hazardous. Most jobs were in large establishments; about 57 percent of all jobs were in establishments with at least 100 employees in 2002 (chart 1). Broadcasting establishments are found throughout the country, but jobs in larger stations are concentrated in large cities.

Occupations in the Industry

Occupations at large broadcast stations and networks fall into five general categories: Program production, newsrelated, technical, sales, and general administration. At small stations, jobs are less specialized, and employees often perform several functions. Although on-camera or on-air positions are the most familiar occupations in broadcasting, the majority of employment opportunities are behind the scenes (table 1).

The majority of jobs in broadcasting are in establishments employing more than 100 workers



Program production occupations. Most television programs are produced by the motion picture and video industry; actors, directors, and producers working on these prerecorded programs are not employed by the broadcasting industry. Program production occupations at television and radio stations create programs such as news, talk, and music shows.

Assistant producers provide clerical support and background research; assist with the preparation of musical, written, and visual materials; and time the production to make sure it does not run over schedule. They also may operate cameras and other audio and video equipment.

Video editors select and assemble pretaped video to create a finished program, applying sound and special effects as necessary. Conventional editing requires assembling pieces of videotape in a linear fashion to create a finished product. The editor first assembles the beginning of the program, then works sequentially towards the end. Newer computerized editing allows an editor to electronically cut and paste video segments. This technique is known as nonlinear editing because the editor is no longer restricted to working sequentially; a segment may be moved at any time to any location in the program.

Producers plan and develop live or taped productions, determining how the show will look and sound. They select the script, talent, sets, props, lighting, and other production elements. They also coordinate the activities of on-air personalities, production staff, and other personnel. *Web site or Internet producers*, a relatively new occupation in the broadcast industry, plan and develop Internet sites that provide news updates, program schedules, and information about popular shows. The producer decides what will appear on the site and is responsible for its overall design and maintenance.

Announcers read news items and provide other information, such as program schedules and station breaks for commercials or public service information. Many radio announcers are referred to as disc jockeys, playing recorded music on radio sta-

tions. They may take requests from listeners; interview guests; and comment on the music, weather, or traffic. Most stations now have placed all of their advertisements, sound bites, and music on a computer, which is used to select and play or edit the items. Technological advances have simplified the monitoring and adjusting of the transmitter, leaving disc jockeys responsible for all of the tasks associated with keeping a station on the air. Traditional tapes and CDs are used only as backups in case of a computer failure. Announcers and disc jockeys need a good speaking voice; the latter also need a significant knowledge of music.

Program directors are in charge of on-air programming in radio stations. Program directors decide what type of music will be played, supervise on-air personnel, and often select the specific songs and the order in which they will be played. Considerable experience, usually as a disc jockey, is required, as well as a thorough knowledge of music.

News-related occupations. News, weather, and sports reports are important to many television stations because they attract a large audience and account for a large proportion of revenue. Many radio stations depend on up-to-the-minute news for a major share of their programming. Program production occupations, such as producers and announcers, also work on the production of news programs.

Reporters gather information from various sources, analyze and prepare news stories, and report on the air. *Correspondents* report on news occurring in U.S. and foreign cities in which they are stationed. *Newswriters* write and edit the news stories from information collected by reporters. Newswriters may advance to positions as reporters or correspondents.

Broadcast news analysts, also known as news anchors, analyze, interpret, and broadcast news received from various sources. News anchors present news stories and introduce videotaped news or live transmissions from on-the-scene reporters. Newscasters at large stations may specialize in a particular field. Weathercasters, also called weather reporters, report current and forecasted weather conditions. They gather information from national satellite weather services, wire services, and local and regional weather bureaus. Some weathercasters are trained *atmospheric scientists* and can develop their own weather forecasts. Sportscasters are responsible for reporting sporting events. They usually select, write, and deliver the sports news for each newscast.

Assistant news directors supervise the newsroom; they coordinate wire service reports, tape or film inserts, and stories from individual newswriters and reporters. Assignment editors assign stories to news teams, sending the teams on location if necessary.

News directors have overall responsibility for the news team of reporters, writers, editors, and newscasters, as well as studio and mobile unit production crews. This senior administrative position entails responsibilities that include determining what events to cover, and how and when they will be presented in a news broadcast.

Technical occupations. Employees in these occupations operate and maintain the electronic equipment that records and trans-

mits radio or television programs. The titles of some of these occupations use the terms "engineer," "technician," and "operator" interchangeably.

Radio operators manage equipment that regulates the signal strength, clarity, and range of sounds and colors of broadcasts. They also monitor and log outgoing signals and operate transmitters. *Audio and video equipment technicians*

Table 1. Employment of wage and salary workers in broadcasting by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	334	100.0	8.5
Management, business, and financial occupations	36	10.9	15.4
Top executives	10	3.1	10.3
Advertising, marketing, promotions, public relations, and sales managers	9	2.7	15.3
Operations specialties managers	6	1.8	15.6
Business operations specialists	4	1.1	25.6
Professional and related occupations	162	48.4	1.3
Computer specialists	7	2.1	32.8
Engineers	6	1.9	7.2
Drafters, engineering, and mapping technicians	3	1.0	18.5
Art and design occupations	4	1.3	11.6
Producers and directors	19	5.6	0.6
Announcers	40	12.0	-17.9
News analysts, reporters and correspondents	18	5.3	6.8
Editors	4	1.3	-1.4
Audio and video equipment technicians ...	5	1.5	12.1
Broadcast technicians	22	6.7	7.1
Photographers	4	1.3	-4.7
Camera operators, television, video, and motion picture	10	2.9	1.1
Sales and related occupations	45	13.3	9.4
Advertising sales agents	29	8.6	6.3
Telemarketers	4	1.3	1.0
Office and administrative support occupations	61	18.1	10.8
First-line supervisors/managers of office and administrative support workers	4	1.2	4.9
Bookkeeping, accounting, and auditing clerks	4	1.2	-3.2
Customer service representatives	17	5.0	39.7
Material recording, scheduling, dispatching, and distributing occupations	6	1.7	17.8
Secretaries and administrative assistants	9	2.8	-4.5
Office clerks, general	7	2.1	-3.2
Installation, maintenance, and repair occupations	26	7.7	35.9
Telecommunications equipment installers and repairers, except line installers	5	1.5	30.1
Telecommunications line installers and repairers	12	3.6	41.5

NOTE: May not add to totals due to omission of occupations with small employment.

operate equipment to regulate the volume, sound quality, brightness, contrast, and visual quality of a broadcast. *Broadcast technicians* set up and maintain electronic broadcasting equipment. Their work can extend outside the studio, as when they set up portable transmitting equipment or maintain stationary towers.

Television and video camera operators set up and operate studio cameras, which are used in the television studio, and electronic news gathering cameras, which are mobile and used outside the studio when a news team is pursuing a story at another location. Camera operators need training in video, as well as some experience in television production.

Master control engineers ensure that all of the radio or television station's scheduled program elements, such as on-location feeds, prerecorded segments, and commercials, are smoothly transmitted. They also are responsible for ensuring that transmissions meet FCC requirements.

Technical directors direct the studio and control room technical staff during the production of a program. They need a thorough understanding of both the production and technical aspects of broadcasting, acquired as a lighting director or camera operator, or as another type of broadcast worker.

Network and computer systems administrators and *network systems and data communications analysts* design, set up, and maintain systems of computer servers. These servers store recorded programs, advertisements, and newsclips.

Assistant chief engineers oversee the day-to-day technical operations of the station. *Chief engineers* or *directors of engineering* are responsible for all of the station's technical facilities and services. These workers need a bachelors' degree in electrical engineering, technical training in broadcast engineering, and years of broadcast engineering experience acquired in less responsible positions.

Sales, promotions, and marketing occupations. Most workers in this category are *advertising sales agents*, sometimes known as *account executives*. They sell advertising time to sponsors, advertising agencies, and other buyers. Sales representatives must have a thorough knowledge of the size and characteristics of their network's or station's audience, including income levels, gender, age, and consumption patterns. Sales work has expanded beyond the traditional role of simply selling advertising to a wide range of marketing efforts. Stations earn additional revenue through broadcasting from a business, such as a dance club. Businesses also sponsor concerts or other promotions that are organized by a station. In return for sponsorship, the business may set up a booth or post large signs.

Continuity directors schedule and produce commercials. Continuity directors carefully schedule commercials, taking into account both the timeslot in which a commercial is to be played, as well as competing advertisements. For example, two car dealership advertisements should not be played during the same commercial break. Continuity directors also create and produce advertisements for clients who do not produce their own.

Large stations and networks generally have several workers who spend all of their time handling sales. *Sales worker supervisors*, who may handle a few large accounts personally, supervise these workers. In small stations, part-time sales personnel

or announcers often handle sales responsibilities during hours they are not on the air.

General administration. *General managers* or *station managers* coordinate all radio and television station activities. In very small stations, the manager and a bookkeeper may handle all the accounting, purchasing, hiring, and other routine office work. In larger stations, the general administrative staff includes business managers, accountants, lawyers, personnel workers, public relations workers, and others. They are assisted by office and administrative support workers such as secretaries, word processors, typists, and financial clerks.

Training and Advancement

Professional, management, and sales occupations generally require a college degree; technical occupations often do not. It is easier to obtain employment and gain promotions with a degree, especially in larger, more competitive markets. Advanced schooling is generally required for supervisory positions—including technical occupations—having greater responsibility and higher salaries.

Entry-level jobs in news or program production increasingly require a college degree and some broadcast experience. Approximately 450 colleges offer formal programs in journalism and mass communications, including radio and television broadcasting. Some community colleges offer 2-year programs in broadcasting. Broadcast trade schools offer courses that last 6 months to a year and teach radio and television announcing, writing, and production.

Individuals pursuing a career in broadcasting often gain initial experience through work at college radio and television stations or through internships at professional stations. Although these positions are usually unpaid, they sometimes provide college credit or tuition. More importantly, they provide hands-on experience and a competitive edge when applying for jobs. In this highly competitive industry, broadcasters are less willing to provide on-the-job training, and instead seek candidates who can perform the job immediately.

Some technical positions require only a high school diploma. However, many broadcast stations seek individuals with training in broadcast technology, electronics, or engineering from a technical school, community college, or 4-year college. An understanding of computer networks and software will become more important as the industry introduces more digital technology. Supervisory technical positions and jobs in large stations generally require a college degree.

The Society of Broadcast Engineers (SBE) issues certification to technicians who pass a written examination. Several classes of certification are available, requiring increasing levels of experience and knowledge for eligibility. The Telecommunications Act of 1996 mandated that the FCC drop its licensing requirements for transmitter maintenance; SBE certification has filled the void left by the elimination of this license.

Employees in the radio and television broadcasting industry often find their first job in broadcast stations serving smaller markets. Competition for positions in large metropolitan areas is stronger, and these stations usually seek highly experienced per-

sonnel. Because many radio and television stations are small, workers in this industry often must change employers to advance. Relocation to other parts of the country frequently is necessary.

Earnings

Weekly earnings of nonsupervisory workers in broadcasting averaged \$642 in 2002, higher than the average of \$506 for all private industry. As a common rule, earnings of broadcast personnel are highest in large metropolitan areas. Earnings in selected occupations in broadcasting for 2002 appear in table 2.

Table 2. Median hourly earnings of the largest occupations in broadcasting, 2002

Occupation	Broadcasting, except Internet	All industries
General and operations managers	\$37.99	\$32.80
Telecommunications equipment installers and repairers, except line installers	20.13	22.78
Telecommunications line installers and repairers	18.46	19.06
Advertising sales agents	17.97	18.11
Executive secretaries and administrative assistants	16.51	16.06
News analysts, reporters and correspondents	16.05	14.67
Customer service representatives	13.86	12.62
Camera operators, television, video, and motion picture	12.66	15.73
Broadcast technicians	11.86	13.35
Office clerks, general	11.31	10.71
Announcers	9.87	9.91

The principal unions representing employees in broadcasting are the National Association of Broadcast Employees and Technicians (NABET), the International Brotherhood of Electrical Workers (IBEW), the International Alliance of Theatrical Stage Employees (IATSE), and the American Federation of Television and Radio Artists (AFTRA).

Outlook

Employment in broadcasting is expected to increase almost 9 percent over the 2002-12 period, more slowly than the 16 percent projected for all industries combined. Factors contributing to the relatively slow rate of growth include industry consolidation, introduction of new technologies, and competition from other media outlets. Keen competition is expected for many jobs, particularly in large metropolitan areas, due to the large number of jobseekers attracted by the glamour of this industry. Job prospects will be best for applicants with a college degree in broadcasting, journalism, or a related field, as well as relevant work experience.

Consolidation of individual broadcast stations into large networks, especially in radio, has increased due to relaxed ownership regulations. This trend will continue to limit employment growth as networks use workers more efficiently. For example, a network can run eight radio stations from one office, producing news programming at one station and then using the programming for broadcast from other stations, thus eliminating the need for multiple news staffs. Similarly, technical workers, upper

level management, and marketing and advertising sales workers are pooled to work for several stations simultaneously. In the consolidation of the radio industry, several major companies have recently purchased many stations nationwide. These companies plan to achieve cost savings through consolidation and economies of scale, limiting employment growth.

The introduction of new technology also is slowing employment growth. Conventional broadcast equipment used to be relatively specialized; each piece of equipment served a separate function and required an operator with specialized knowledge. Newer, computerized equipment often combines the functions of several older pieces of equipment and does not require specialized knowledge for operation. This reduces the need for certain types of workers, including those responsible for editing, recording, and creating graphics. In addition, increased use of remote monitoring equipment allows technical workers in one location to operate and monitor transmissions at a remote station.

Job growth also is being constrained by the use of radio and television programming created by services outside the broadcasting industry. These establishments provide prepared programming, including music, news, weather, sports, and professional announcer services. The services can easily be accessed through satellite connections and reduce the need for program production and news staff at radio and television stations. Broadcasters also anticipate increased competition from Internet media outlets, such as video-on-demand services.

Radio broadcasters expect continued growth in revenues as national media companies, with cable stations, broadcast networks, and radio networks, use their combined marketing power to include radio advertising packages with many marketing deals. The new national scope of radio networks allows radio to more effectively sell advertising to large national advertisers, to better compete with television networks. The major threats to the radio industry, especially smaller, marginal stations, are from car CD (compact disk) players and from satellite radio, which functions like cable television with subscribers paying a monthly fee.

Sources of Additional Information

For a list of schools with accredited programs in broadcast journalism, send a request to:

- Accrediting Council on Education in Journalism and Mass Communications, University of Kansas, School of Journalism, Stauffer-Flint Hall, Lawrence, KS 66045-7575. Internet: <http://www.ku.edu/~acejmc>

For career information and links to employment resources, contact:

- National Association of Broadcast Employees and Technicians, Communications Workers of America, 501 Third St. NW., Washington, DC 20001.

For information on broadcasting education and scholarship resources, contact:

- National Association of Broadcasters, Career Center, 1771 N St. NW., Washington, DC 20036.
Internet: <http://www.nab.org>

For descriptions of occupations in the cable industry and links to employment resources, contact:

- National Cable and Telecommunications Association, 1724 Massachusetts Ave. NW., Washington, DC 20036.

Information on the following occupations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Actors, producers, and directors
- Advertising, marketing, promotions, public relations, and sales managers
- Announcers
- Broadcast and sound engineering technicians and radio operators
- News analysts, reporters, and correspondents
- Television, video, and motion picture camera operators and editors
- Writers and editors

Motion Picture and Video Industries

(NAICS 5121)

SIGNIFICANT POINTS

- Keen competition is expected for the more glamorous jobs—writers, actors, producers, and directors; other workers—multimedia artists and animators, and film and video editors, among others—should enjoy better job prospects.
- Although many films are shot on location throughout the United States and abroad, employment is centered in several major cities, particularly New York and Los Angeles.
- Many workers have formal training, but experience, talent, creativity, and professionalism are the factors that are most important in getting many jobs in this industry.

Nature of the Industry

The U.S. motion picture industry produces much of the world's feature films and many of its television programs. The industry is dominated by several large studios, based mostly in Hollywood. However, with the increasing popularity and worldwide availability of cable television, video recorders, digital video disks (DVDs), and the Internet, many small and medium-sized independent filmmaking companies have sprung up to fill the growing demand. In addition to producing feature films and filmed television programs, the industry produces made-for-television movies, music videos, and commercials. Establishments engaged primarily in operating motion picture theaters and exhibiting motion pictures or videos at film festivals also are included in this industry. Other establishments provide postproduction services to the motion picture industry, such as editing, film and tape transfers, titling and subtitling, credits, closed captioning, computer-produced graphics, and animation and special effects.

Some motion picture and video companies produce films for limited, or specialized, audiences. Among these films are documentaries, which use film clips and interviews to chronicle actual events with real people, and educational films ranging from "do-it-yourself" projects to exercise films. In addition, the industry produces business, industrial, and government films that promote an organization's image, provide information on its activities or products, or aid in fundraising or worker training. Some of these films are short enough to release to the public through the Internet; many offer an excellent training ground for beginning filmmakers.

Making a movie can be a difficult, yet rewarding, experience. However, it is also a very risky one. Although thousands of movies are produced each year, only a small number of them account for most box office receipts. Indeed, most films do not make a full return on their investment from domestic box office revenues, so filmmakers rely on profits from other markets, such as broadcast and cable television, videocassette and DVD sales and rentals, and foreign distribution. In fact, major film companies are receiving a growing portion of their revenue from abroad. These cost pressures have reduced the number of film production companies to the current seven major studios producing most

of the television programs and movies released nationally. Smaller and independent filmmakers often find it difficult to finance new productions, as large motion picture production companies prefer to support established filmmakers. However, digital technology is lowering production costs for some small-budget films, enabling more independents to succeed in getting their films released nationally.

Although studios and other production companies are responsible for financing, producing, publicizing, and distributing a film or program, the actual making of the film often is done by hundreds of small businesses and independent contractors hired by the studios on an as-needed basis. These companies provide a wide range of services, such as equipment rental, lighting, special effects, set construction, and costume design, as well as much of the creative and technical talent that go into producing a film. The industry also contracts with a large number of workers in other industries that supply support services to the crews while they are filming, such as truck drivers, caterers, electricians, and makeup artists. Many of these workers, particularly in Los Angeles, depend on the motion picture industry for their livelihood.

Most motion pictures are still made on film. However, digital technology and computer-generated imaging are rapidly making inroads and are expected to transform the industry. Making changes to a picture is much easier with digital techniques. Backgrounds can be inserted after the actors perform on a sound stage, or locations can be digitally modified to reflect the script. Even actors can be created digitally. Independent filmmakers will continue to benefit from this technology, as reduced costs improve their ability to compete with the major studios.

Digital technology also makes it possible to distribute movies to theaters through the use of satellites or fiber-optic cable, although relatively few theaters are capable of receiving them in that manner right now. In the future, however, more theaters will be capable of receiving films digitally, and the costly process of producing and distributing bulky films will be sharply reduced.

Working Conditions

Most individuals in this industry work in clean, comfortable surroundings. Filming, or "shooting," outside the studio or "on lo-

cation," however, may require working in adverse weather and under unpleasant and sometimes dangerous conditions. Actors, producers, directors, cinematographers, and camera operators also need stamina to withstand the heat of studio and stage lights, long and irregular hours, and travel.

Directors and producers often work under stress as they try to meet schedules, stay within budget, and resolve personnel and production problems. Actors, producers, directors, cinematographers, and camera operators face the anxiety of rejection and intermittent employment. Writers and editors must deal with criticism and demands to restructure and rewrite their work many times until the producer and director are finally satisfied. All writers must be able to withstand such criticism and disappointment; freelance writers are under the added pressure of always looking for new jobs. In spite of these difficulties, many people find that the glamour and excitement of filmmaking more than compensate for the frequently demanding and uncertain nature of careers in motion pictures.

Employment

In 2002, there were about 360,000 wage and salary jobs in the motion picture and video industries. Most of the workers were in motion picture and video production. They are involved in casting, acting, directing, editing, film processing, motion picture and videotape reproduction, and equipment and wardrobe rental. Although seven major studios produce most of the motion pictures released in the United States, many small companies are used as contractors throughout the process. Most motion picture and distribution establishments employ fewer than 10 workers (chart 1).

Many additional individuals work in the motion picture and video industries on a freelance, contract, or part-time basis, but accurate statistics on their numbers are not available. Numerous people in the film industry are self-employed, selling their services to anyone who needs them and often working on productions for many different companies during the year. Competition for these jobs is intense, and many people are unable to earn a living solely from freelance work.

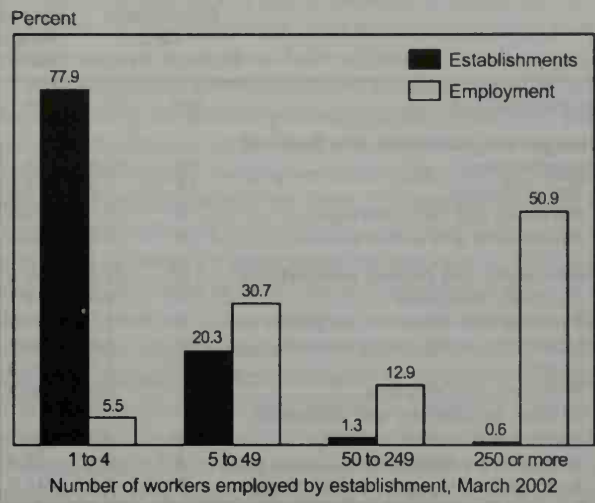
Employment in the production of motion pictures and other films for television is centered in Los Angeles and New York City. Studios also are located in Chicago; Orlando; Irving, Texas; and Wilmington, North Carolina. In addition, many films are shot on location throughout the United States and abroad.

Occupations in the Industry

The length of the credits at the end of most feature films and television programs gives an idea of the variety of workers involved in producing and distributing films. The motion picture industry employs workers in every major occupational group. Professionals and related workers account for about 3 in 10 salaried jobs in the industry. More than 1 in 4 salaried workers hold jobs in service occupations (table 1).

Jobs in the industry can be broadly classified according to the three phases of filmmaking: Preproduction, production, and postproduction. Preproduction is the planning phase, which includes budgeting, casting, finding the right location, preparing and approving the set and costume design, construction the set,

A few large establishments that employ 250 or more workers have about half of all the jobs in the motion picture and video industries



and scheduling. Production is the actual making of the film. The number of people involved in the production phase can vary from a few, for a documentary film, to hundreds, for a feature film. It is during this phase that the actual filming is done. Postproduction activities take place in editing rooms and recording studios, where the film is shaped into its final form.

Some individuals work in all three phases. *Producers*, for example, are involved in every phase, from beginning to end. These workers look for ideas that they believe can be turned into lucrative film projects or television shows. They may see many films, read hundreds of manuscripts, and maintain numerous contacts with literary agents and publishers. Producers are also responsible for all of the financial aspects of a film, including finding financing for its production. The producer works closely with the director on the selection of the script, the principal members of the cast, and the filming locations, because these decisions greatly affect the cost of a film. Once financing is obtained, the producer works out a detailed budget and sees to it that the production costs stay within that budget. In a large production, the producer also works closely with *production managers*, who are in charge of crews, travel, casting, and equipment. For television shows, much of this process requires especially tight deadlines.

Directors translate the script to film and also are involved in every stage of production. They may supervise hundreds of people, from screenwriters to costume and set designers. Directors are in charge of all technical and artistic aspects of the film or television show. They conduct auditions and rehearsals and approve the location, scenery, costumes, choreography, and music. In short, they direct the entire cast and crew during shooting. *Assistant directors* help them with such details as handling the transportation of equipment, arranging for food and accommodations, and hiring performers who appear in the film, but have no lines. Some directors assume multiple roles, such as *director-producer* or *writer-producer-director*. Successful directors must know how to hire the right people and create effective teams.

Table 1. Employment of wage and salary workers in motion picture and video industries by occupation, 2002 and projected change, 2002-12

(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	360	100.0	31.1
Management, business, and financial occupations	39	10.8	41.4
Top executives	13	3.7	36.8
Marketing and sales managers	2	0.7	45.3
Accountants and auditors	3	0.8	39.5
Professional and related occupations	112	31.2	35.6
Computer specialists	9	2.4	49.1
Electrical and electronics engineers	6	1.7	37.6
Multi-media artists and animators	6	1.6	40.1
Actors	17	4.7	23.9
Producers and directors	11	2.9	40.2
All other entertainers and performers, sports and related workers	12	3.3	24.7
Writers and editors	4	1.1	33.3
Audio and video equipment technicians ...	7	1.9	40.2
Broadcast technicians	3	0.9	40.1
Sound engineering technicians	3	0.9	40.1
Camera operators, television, video, and motion picture	6	1.8	34.7
Film and video editors	9	2.5	40.1
Service occupations	98	27.2	24.4
Combined food preparation and serving workers, including fast food	7	2.1	40.2
Counter attendants, cafeteria, food concession, and coffee shop	27	7.4	24.7
Janitors and cleaners, except maids and housekeeping cleaners	5	1.3	33.1
Motion picture projectionists	7	2.1	-0.2
Ushers, lobby attendants, and ticket takers	40	11.2	21.3
Sales and related occupations	53	14.6	34.5
First-line supervisors managers of retail sales workers	4	1.0	36.1
Cashiers, except gaming	21	5.9	30.3
Sales representatives, wholesale and manufacturing, except technical and scientific products	8	2.3	40.2
All other sales and related workers	9	2.5	40.2
Office and administrative support occupations	43	12.0	22.5
Bookkeeping, accounting, and auditing clerks	6	1.7	19.6
Customer service representatives	3	0.8	40.2
Shipping, receiving, and traffic clerks	4	1.2	23.6
Secretaries and administrative assistants	10	2.8	18.7
Office clerks, general	4	1.2	22.1
Installation, maintenance, and repair occupations	4	1.0	33.9
Production occupations	4	1.1	23.7
Transportation and material moving occupations	7	1.9	24.0
Laborers and freight, stock, and material movers, hand	4	1.1	15.1

NOTE: May not add to totals due to omission of occupations with small employment.

Preproduction occupations. Before a film or a television program moves into the production phase, it begins with an idea that *screenwriters* turn into a script. They either develop an original idea or take an existing literary work and adapt it into a screenplay or television pilot (a sample episode of a proposed television series). Screenwriters work closely with producers and directors. Sometimes they prepare a "shooting script," which has instructions pertaining to shots, camera angles, and lighting. Frequently, screenwriters make changes to reflect the directors' and producers' ideas and desires. The work, therefore, requires not only creativity, but also an ability to write and rewrite many versions of a script under pressure. Although the work of feature film screenwriters generally ends when shooting begins, writing for television usually is a continuous process.

Art directors design the physical environment of the film or television set to create the mood called for by the script. Television art directors may design elaborate sets for use in situation comedies or commercials. They supervise many different people, including *illustrators, scenic designers, model makers, carpenters, painters, electricians, laborers, set decorators, costume designers, and makeup and hairstyling artists*. These positions can provide an entry into the motion picture industry. Many start in such jobs in live theater productions and then move back and forth between the stage, film, and television.

Production occupations. Actors entertain and communicate with the audience through their interpretation of dramatic or comedic roles. Only a small number achieve recognition in motion pictures or television. Many are cast in supporting roles or as walk-ons. Some start as background performers with no lines to deliver. Also called "extras," these are the people in the background—crowds on the street, workers in offices, or dancers at a ball. Others perform stunts, such as driving cars in chase scenes or falling from high places. Although a few actors find parts in feature films straight out of drama school, most support themselves by working for many years outside of the industry. Most acting jobs are found through an agent, who finds auditions that may lead to acting assignments.

Cinematographers, camera operators, and gaffers work together to capture the scenes in the script on film. *Cinematographers* compose the film shots to reflect the mood the director wishes to create. They do not usually operate the camera; instead, they plan and coordinate the actual filming. *Camera operators* handle all camera movements and perform the actual shooting. *Assistant camera operators* check the equipment, load the camera, operate the slate and clappsticks (now electronic) used to record the beginning of a scene, and take care of the equipment. *Commercial camera operators* specialize in shooting commercials. This experience translates easily into documentary work. *Gaffers*, or lighting technicians, set up different kinds of lighting needed for filming. They work for the *director of photography*, who plans all lighting needs. *Sound engineering technicians, film recordists, and boom operators* record dialogue, sounds, music, and special effects during the filming. Sound engineering technicians are the "ears" of the film, supervising all sound generated during filming. They select microphones and

the level of sound from mixers and synthesizers to assure the best sound quality. Recordists help to set up the equipment and are in charge of the individual tape recorders. Boom operators handle long booms with microphones that are moved from one area of the set to another. Because more filming is done on location and the equipment has become compact, lighter, and simpler to operate, one person often performs many of the preceding functions.

Multimedia artists and animators create the movie "magic." Through their imagination, creativity, and skill, they can create anything required by the script, from talking animals to flaming office buildings and earthquakes. Many begin as stage technicians or scenic designers. They not only need a good imagination, but also must be part carpenter, plumber, electrician, and electronics expert. These workers must be familiar with many ways of achieving a desired special effect, because each job requires different skills. Computer skills have become very important in this field. Some areas of television and film production, including animation and visual effects, now rely heavily on computer technology. Although there was a time when elaborate computer animation was restricted to blockbuster movies, much of the three-dimensional work being generated today occurs in small to mid-sized companies. Some specialists create "synthespians"—realistic digital humans—which appear mainly in science fiction productions. These digital images are often used when a stunt or scene is too dangerous for an actor.

Many individuals get their start in the industry by running errands, moving things on the set, and helping with props. *Production assistants* and grips (stagehands) are often used in this way.

Postproduction occupations. One of the most important tasks in filmmaking and television production is editing. After a film is shot and processed, *film and video editors* study footage, select the best shots, and assemble them in the most effective way. Their goal is to create dramatic continuity and the right pace for the desired mood. Editors first organize the footage and then structure the sequence of the film by splicing and resplicing the best shots. They must have a good eye and understand the subject of the film and the director's intentions. The ability to work with digital media also is becoming increasingly important. Strong computer skills are mandatory for most jobs. However, few industrywide standards exist, so companies often look for people with skills in the hardware or software they are currently using.

Assistant editors or *dubbing editors* select the soundtrack and special sound effects to produce the final combination of sight and sound as it appears on the screen. *Editing room assistants* help with the splicing, patching, rewinding, coding, and storing of the film. Some television networks have *film librarians*, who are responsible for organizing, filing, cataloging, and selecting footage for the film editors. There is no one way of entering the occupation of editor; however, experience as a film librarian, sound editor, or assistant editor—plus talent and perseverance—usually help.

Sound effects editors or *audio recording engineers* perform one of the final jobs in postproduction: Adding prerecorded and live sound effects and background music by manipulating vari-

ous elements of music, dialogue, and background sound to fit the picture. Their work is becoming increasingly computer driven as electronic equipment replaces conventional tape-recording devices. The best way to gain experience in sound editing is through work in radio stations, with music groups, or in music videos, or by adding audio to Internet sites.

After the film or television show is finished, *marketing personnel* develop the marketing strategy for the production. They estimate the demand for the film or show and the audience to whom it will appeal, develop an advertising plan, and decide where and when to release the work. *Advertising workers*, or "unit publicists," write press releases and short biographies of actors and directors for newspapers and magazines. They may also set up interviews or television appearances for the stars or director to promote a film. *Sales representatives* sell the finished product. Many production companies hire staff to distribute, lease, and sell their films and made-for-television programs to theater owners and television networks. The best way to enter sales is to start by selling advertising time for television stations.

Large film and television studios are headed by a *chief executive officer* (CEO), who is responsible to a board of directors and stockholders. Various managers, such as *financial managers* and *business managers*, as well as *accountants* and *lawyers*, report to the CEO. Small film companies and those in business and educational film production cannot afford to have so many different people managing only one aspect of the business. As a result, they usually are headed by an *owner-producer*, who originates, develops, produces, and distributes films with just a small staff and some freelance workers. These companies offer good training opportunities to beginners, exposing them to many phases of film and television production.

Training and Advancement

Formal training can be a great asset to workers in filmmaking and television production, but experience, talent, creativity, and professionalism usually are the most important factors in getting a job. Many entry-level workers start out by working on documentary, business, educational, industrial, or government films or in the music video industry. This kind of experience can lead to more advanced jobs.

Actors are usually required to have formal dramatic training or acting experience. Training can be obtained in dramatic arts schools throughout the country, although most schools are located in New York City and Los Angeles. More than 500 colleges and universities offer bachelor's or higher degrees in dramatic and theater arts. Training in singing and dance, experience in modeling, and performing in local and regional theater productions are especially useful. Many actors begin their career by performing in commercials and as extras. Most professional actors rely on agents or managers to find auditions for them.

There are no specific training requirements for producers and directors. Talent, experience, and business acumen are very important. An ability to deal under stress with many different kinds of people also is essential. Directors and producers come from varied backgrounds. Many start as assistant directors and producers; others gain industry experience first as actors, writers,

film editors, or business managers. Formal training in directing and producing is available at some colleges and universities. Individuals interested in production management who have a bachelor's degree or 2 years of on-the-set experience in motion picture or television production may qualify for the Assistant Directors Training Program offered jointly by the Directors Guild of America and the Alliance of Motion Picture and Television Producers. Training is given in New York City and Los Angeles. To enroll in this highly competitive program, individuals must take a written exam and go through a series of assessments.

Although many screenwriters have college degrees, talent and creativity are even more important determinants of success in the industry. Screenwriters need to develop creative-writing skills, a mastery of film language, and a basic understanding of filmmaking. Self-motivation, perseverance, and an ability to take criticism also are valuable. Feature-film writers usually have many years of experience and work on a freelance basis. Many start as copywriters in advertising agencies and as writers for educational film companies, government audiovisual departments, or in-house corporate film divisions. These jobs not only serve as a good training ground for beginners, but also have greater job security than freelancing has.

Cinematographers, camera operators, and sound engineers usually have either a college or technical school education, or they go through a formal training program. Computer skills are required for many editing, special-effects, and cinematography positions.

In addition to colleges and technical schools, many private institutes offer training programs on various aspects of filmmaking, such as screenwriting, editing, directing, and acting. For example, the American Film Institute offers training in directing, production, cinematography, screenwriting, and production design.

The educational background of managers and top executives varies widely, depending on their responsibilities. Most managers have a bachelor's degree in liberal arts or business administration. Their majors often are related to the departments they direct. For example, a degree in accounting or finance, or in business administration with an emphasis on accounting or finance, is suitable academic preparation for financial managers.

Employers prefer individuals with an undergraduate degree in marketing, advertising, or business for top-level positions in those departments. Experience in retail and print advertising also is helpful. A high school diploma and retail or telephone sales experience are beneficial for sales jobs.

Promotion opportunities for many jobs are extremely limited because of the narrow scope of duties and skills of the occupations. Thousands of jobs are also temporary, intermittent, part time, or on a contract basis, making advancement difficult. Individual initiative is very important for advancement in the motion picture industry.

Screenwriters usually have had writing experience as freelance writers or editors and in other employment settings. As they build a reputation in their career, demand for their screenplays or teleplays increases, and their earnings grow. Some become directors or producers. Film and video editors often begin as editing room assistants, cinematographers usually start as assistant camera operators, and sound recordists often start as boom

operators and gradually progress to become sound engineers. Computer courses in digital sound and electronic mixing often are important for upward mobility.

General managers may advance to top executive positions, such as executive or administrative vice president, in their own firm or to similar positions in a larger firm. Top-level managers may advance to chief operating officer and chief executive officer. Financial, marketing, and other managers may be promoted to top management positions or may transfer to closely related positions in other industries. Some may start their own businesses.

Earnings

Earnings of workers in the motion picture and video industries vary, depending on education and experience, type of work, union affiliation, and duration of employment. In 2002, median weekly earnings of workers in the motion picture and video industries were \$653, compared with \$506 for workers in all industries combined.

On the basis of a union contract negotiated in July 2003, motion picture and television actors who are members of the Screen Actors Guild earn a minimum daily rate of \$678, or \$2,352 for a 5-day week. They also receive additional compensation for reruns. Annual earnings for many actors are low, however, because employment is intermittent. Many actors supplement their incomes from acting with earnings from other jobs outside the industry. Some established actors get salaries well above the minimums, and, of course, earnings of the few top stars are astronomical.

Salaries for directors vary widely. Producers seldom get a set salary; instead, they get a percentage of a show's earnings or ticket sales. Earnings in selected occupations in the motion picture and video industries appear in table 2.

Unions are very important in this industry. Virtually all film production companies and television networks sign contracts with union locals that require the employment of workers accord-

Table 2. Median hourly earnings of the largest occupations in motion picture and video industries, 2002

Occupation	Motion picture and video industries	All industries
General and operations managers	\$44.64	\$32.80
Camera operators, television, video, and motion picture	22.38	15.73
Sales representatives, wholesale and manufacturing, except technical and scientific products	20.12	20.54
Film and video editors	19.92	18.40
Executive secretaries and administrative assistants	17.45	16.06
Audio and video equipment technicians	16.03	14.96
Motion picture projectionists	7.56	7.97
Cashiers	6.78	7.41
Ushers, lobby attendants, and ticket takers ...	6.73	7.02
Combined food preparation and serving workers, including fast food	6.73	6.97
Counter attendants, cafeteria, food concession, and coffee shop	6.61	7.32

ing to union contracts. Nonunion workers may be hired because of a special talent, to fill a specific need, or for a short period. Although union membership is not mandated, nonunion workers risk eligibility for future work assignments. Actors who appear in filmed entertainment—including television, commercials, and movies—belong to the Screen Actors Guild; those in broadcast television generally belong to the American Federation of Television and Radio Artists. Film and television directors are members of the Directors Guild of America. Art directors, cartoonists, editors, costumers, scenic artists, set designers, camera operators, sound technicians, projectionists, and shipping, booking, and other distribution employees belong to the International Alliance of Theatrical Stage Employees, Moving Picture Technicians, Artists and Allied Crafts (I.A.T.S.E.) or the United Scenic Artists Association.

Outlook

Employment in the motion picture and video industries is projected to grow 31 percent between 2002 and 2012, roughly double the 16 percent growth projected for all industries combined. Job growth will result from the explosion of programming needed to fill an increasing number of cable and satellite television channels, both in the United States and abroad. Also, more films will be needed to meet in-home demand for videos, DVDs, and films over the Internet. Responding to an increasingly fragmented audience will create many opportunities to develop films. The international market for U.S.-made films is expected to continue growing as more countries and foreign individuals acquire the ability to view our films. As the industry registers employment growth, many more jobs will arise through people leaving the industry, mainly for more stable employment.

There is concern in the motion picture industry over the number of films that are being made abroad. In response to a number of tax breaks offered chiefly by English-speaking countries, especially Canada, U.S. filmmakers have increasingly moved the production of films abroad. Lower budget films, such as made-for-television movies and commercials, have fled in large numbers in order to reduce costs. In addition, more feature films are being made abroad, but mostly for artistic reasons. When film production leaves, it takes away the jobs of most of the noncritical supporting actors and behind-the-scenes workers, who are usually hired locally. To address this issue, several cities and States have initiated tax breaks and other incentives to encourage filmmakers to make movies in their locales. Also, the U.S. Congress is considering legislation that offers tax incentives for filmmakers to stay in the United States.

The motion picture industry is also concerned about piracy, which can occur in several ways. For example, as the power and

speed of the Internet grows, more movies are being downloaded directly into homes, causing losses in revenue for the motion picture industry. The industry has launched an anti-piracy initiative in order to combat this trend, which potentially could have an adverse affect on employment.

Opportunities will be better in some occupations than in others. Computer specialists, multimedia artists and animators, film and video editors, and others skilled in digital filming, editing, and computer-generated imaging should have the best job prospects. There also will be opportunities for broadcast and sound engineering technicians and other specialists, such as gaffers and set construction workers. In contrast, keen competition can be expected for the more glamorous high-paying jobs in the industry—namely, writers, actors, producers, and directors—as many more people seek a lesser number of jobs. Small or independent filmmakers may provide the best job prospects, because these companies are likely to grow more quickly as the costs of production decline due to digital technology.

Sources of Additional Information

For general information on employment as an actor, contact either of the following organizations:

- Screen Actors Guild, 5757 Wilshire Blvd., Los Angeles, CA 90036-3600. Internet: <http://www.sag.org>
- American Federation of Television and Radio Artists—Screen Actors Guild, Suite 204, 4340 East-West Hwy., Bethesda, MD 20814. Internet: <http://www.aftra.org>

For general information about arts education and a list of accredited college-level programs, contact

- National Office for Arts Accreditation in Higher Education, 11250 Roger Bacon Dr., Suite 21, Reston, VA 22091. Internet: <http://www.arts-accredit.org>

Information on many motion picture and video occupations, including the following, may be found in the 2004-05 *Occupational Outlook Handbook*:

- Actors, producers, and directors
- Artists and related workers
- Broadcast and sound engineering technicians and radio operators
- Television, video, and motion picture camera operators and editors
- Writers and editors

Publishing, Except Software

(NAICS 5111)

SIGNIFICANT POINTS

- Writers and editors face keen competition for these highly sought-after jobs in the industry.
- The ability to meet tight deadlines is crucial for most jobs in this industry.
- Mergers will make firms more productive and limit employment growth; computerization will cause the number of newspaper printing jobs to decline.

Nature of the Industry

The publishing industry produces a variety of publications, including magazines, books, newspapers, and directories. It also produces greeting cards, data bases, calendars, and other published material, excluding software. Although mostly producing printed materials, the publishing industry is increasingly producing its material in other formats, such as audio, CD-ROM, or other electronic media.

Newspapers employ the largest number of workers in the publishing industry. With a staff of reporters and correspondents, newspapers report on events taking place locally and around the world. Despite the local nature of most newspaper reporting, the newspaper industry is dominated by several large corporations that own most of the newspapers in the country. It also is becoming common for companies to buy several newspapers in a single region, called "clustering." In this way, newspapers can be produced more efficiently. For example, advertising sales agents can now sell advertising space for multiple newspapers, which also share the same printing plant.

Book publishing is also dominated by a few very large companies, primarily based in New York City. However, some midsized and small publishers across the country are thriving, particularly those that specialize in certain subjects. Textbooks and technical, scientific, and professional books provide nearly half of the revenues of the book publishing industry. The other half consists of adult trade—which is what is typically found in a bookstore—and juvenile, religious, paperback, mail-order, book club, and reference books.

Magazine, or periodical, publishers run the gamut from small one- or two-person shops to large media conglomerates that may publish dozens of magazines. There are two types of magazines—business-to-business, called "trade," and consumer magazines. Trade magazines serve a particular industry, profession, or service, while consumer magazines are written for general audiences.

Although the content and formats may vary, most publishers follow similar steps to produce their publishable material. First, editorial departments must acquire the content, or material, to be published. Some publishers have a staff of writers, reporters, and editors who research and write articles, stories, and other text for the publications. Photographers and artists are also brought in to supplement the stories with photos and illustrations as needed. Other publishers purchase their material, which

may also include photos and artwork, from outside sources, mainly independent "freelance" writers, photographers, or artists. When this is done, the publishers obtain the legal right to publish the material from the content providers prior to publication. After the story or article is written, the manuscript is reviewed to check that the information it contains is accurate and then edited to ensure that it uses correct grammar and a writing style that is clear and interesting. Editors and publishers develop captions and headlines and design the pages and the covers.

The sale of advertisements, including classified advertising, is a major source of revenue for magazines, newspapers, and directories, such as the telephone Yellow Pages. While most commercial advertisements are produced by advertising agencies, small advertisers may require the help of the copywriters and graphic artists of the publisher's advertising department staff to create an advertisement.

When complete, all of the content—manuscript, photos and captions, and illustrations and any other artwork, including advertisements—is collected at one location and, with the help of desktop publishing software, the pages are laid out. Most newspapers and many magazines have art and design staffs that perform this "prepress" operation; other publishers usually contract out their prepress to companies in the printing industry, along with the actual printing of the publication.

Newspaper publishers usually own the printing plants that print their newspapers. Over the years, this type of printing operation has become highly automated and the skill sets needed to produce a newspaper are changing with the technology. The dominant printing process used to produce newspapers is lithography. The process involves putting the pages of the newspaper on film, and then "burning" the images from the film onto a thin aluminum plate, which is then installed on a press. In the plant, rolls of paper are brought in from the warehouse, the plates are treated with chemicals, ink is mixed, and presses move the paper along the rotating inked plates at very high rates of speed.

Publishers' publicity, marketing, and circulation departments are responsible for promoting a publication and increasing sales and circulation. Book publishers, in particular, promote new books by creating elaborate publicity campaigns involving book signings and public appearances by the author.

Getting the publication to the readers is a function of the distribution department. Major book publishers often have large

warehouse operations, where books are stored and from which they are delivered as needed. Newspapers and magazines, however, distribute each issue only once. Immediately after they are printed, newspapers are folded, filled with inserts, bundled and wrapped. The newspapers are then transported to distributors, who deliver the newspapers to newsstands and individual carriers. Another major function of the department in newspapers is making sure that the newspaper is delivered on time at readers' doorsteps. Magazines are mailed to subscribers after printing or shipped to retail distributors. Many magazines and some newspapers contract out their distribution.

Much of the publishing industry is venturing online. Newspapers, in particular, and some magazines have extensive Web sites that are updated around the clock as news breaks. These Web sites may have their own writers and editors to supply content, but, for the most part, they reformat material developed by the print publication's regular staff. Books are also beginning to be reproduced electronically, so that they can be read on handheld "readers" or on computers.

Table 1. Establishments and wage and salary employment in publishing, except software, by detailed industry, 2002

Industry segment	Establishments	Employment
Total	100.0	100.0
Newspapers	36.8	54.6
Periodicals	32.8	22.0
Book publishing	15.1	11.8
Directory and mailing lists	9.2	7.2
Other publishers	6.1	4.4

Computerization, in particular digital technology, is having a significant impact on the publishing industry. Digital photography eliminates the need for film processing and allows for easy manipulation of images. Electronic mail also allows advertisers to send their ads directly to the publisher's production depart-

ment for insertion. In the latest print technologies, computers use lasers to burn images and text into the printing plate, eliminating the need to produce a film negative of each page.

Working Conditions

Meeting deadlines is one of the primary conditions of employment in this industry. Magazines and newspapers, in particular, are published on a very tight schedule and workers must be prepared to meet these deadlines. This can often make for a very chaotic and stressful environment, and employees frequently may be required to work overtime. Working nights, weekends, and holidays also is common, especially for those working on newspapers. The average nonsupervisory worker in newspaper publishing worked 33.0 hours per week in 2002, compared with 33.9 hours per week across all industries. Within periodical publishing, nonsupervisory workers worked an average of 36.1 hours per week, and 39.5 hours per week in book publishing. Part-time employment is significant in this industry, with 17 percent working part time. Newspaper distributors and drivers usually work 5 to 6 hours a day, often in the middle of the night. Also, some telephone advertising and classified sales representatives work part time.

Writers, editors, reporters, and correspondents have the most varied working conditions. Many work from home, particularly in book publishing, sending manuscripts back and forth using electronic mail. For most writers and reporters, travel is required to perform research and conduct interviews. News correspondents for large metropolitan newspapers or national news publications may be stationed in cities around the world, reporting on events in their territory.

Many advertising sales agents also travel in order to meet with potential customers, although some sell over the telephone. Rejection by clients and the need to meet quotas can be stressful for some agents.

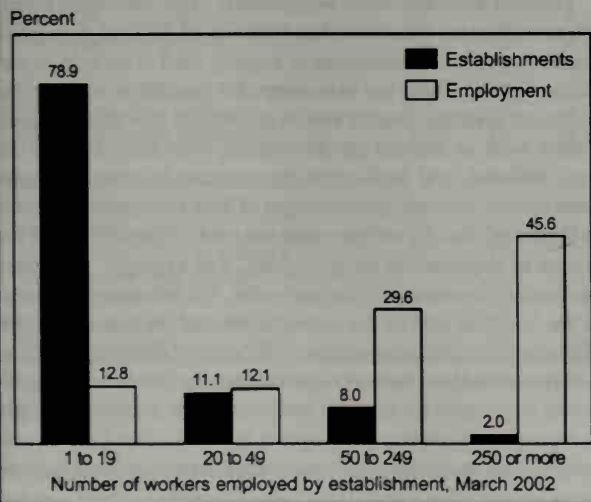
At headquarters, many in publishing work in comfortable, private offices, while others—particularly at newspapers—work in large, noisy, cubicle-filled rooms. Classified advertising clerks and customer service representatives increasingly work in call-center environments, manning telephones much of the day. Newspaper pressrooms are manufacturing plants that can be noisy and dangerous if safety procedures are not followed, but computerization of the machines has reduced injuries. Occurrences of work-related injury and illness for 2002 in the publishing industry ranged from an average of 1.4 per 100 full-time workers in periodical publishing to 4.2 per 100 full-time workers in newspaper publishing, lower than the average of 5.3 for all private industry.

Employment

The publishing industry provided almost 714,000 wage and salary jobs in 2002. In addition, there were 39,000 self-employed workers. The industry does not include independent (or "freelance") writers, artists, journalists, or photographers, whose jobs are included in the arts, entertainment, and recreation industry, but whose contributions of content material to this industry are significant.

Newspaper publishing companies employ the largest number of people in this industry, because they write much of their own

The largest 10 percent of establishments in publishing, except software, have 75 percent of the industry's jobs



material and typically print, and sometimes distribute, their newspapers. While newspaper publishing is done throughout the country, magazine and book publishers are based mostly in large cities. The largest concentration of publishers is in New York City. Although most establishments in this industry are small, most workers work at the largest ones. (See chart)

Occupations in the Industry

Most occupations in the publishing industry fall into 1 of 4 categories: Writing and editing; production; advertising sales and marketing; and general administration. (See table 2.) However, variations in the number and type of workers employed occur by type of publication. For example, most book publishing companies employ few writers because most of their content is acquired from freelance writers and photographers. In contrast, newspapers employ a number of writers and reporters, who supply the content for the paper. Also, newspapers generally perform their own printing, whereas most books and magazines are printed by companies in the printing industry. Differences also exist depending on the size of the company and the variety of media in which the company publishes.

Writing and editing occupations. Everything that is published in this industry must first be written. *Writers and authors* and *reporters and correspondents* write the articles, stories, and other text that end up in publications. Writers are assigned stories to write by *editors*. At newspapers and news magazines, reporters usually specialize in certain categories, or "beats," such as education, crime, sports, or world news. Writers and reporters gather information on their topic by performing Internet and library research and by interviewing people either in person or by telephone. They must then organize their material and write it down in a coherent manner that will interest and entertain readers. Copywriters, who write advertising copy, also are common in this industry.

Editors are essential to a publication. They review, rewrite, and edit the work of writers. They may also do original writing, such as producing editorials for newspapers or columns for magazines. In book publishing, they oversee the acquisition and selection of material, often working directly with the authors to achieve the final product. Most publishing companies employ several types of editors. The executive editor generally has the final say about what will be published and how it will be covered and presented. The managing editor is responsible for the day-to-day operation of the editorial department and makes sure that material produced conforms to guidelines and that deadlines are met. Associate and assistant editors give assignments to writers and reporters, oversee projects, and do much of the editing of text. Copy editors review manuscripts or reporters' copy for accuracy, content, grammar, and style.

Other occupations that work closely with the editorial department are *art and design workers* and *photographers*, whose work often complements the written material. They illustrate children's books, photograph news events, and design book jackets and magazine covers, and lay out every page of publications. The *art director* determines the overall look of the publication, overseeing placement of text, artwork and photographs, and any advertising on the page, and selecting type sizes and styles, or fonts.

Production occupations. *Industrial production managers*, with the help of *production and planning clerks*, oversee the production of the publication. They set up production schedules and see that deadlines are met. They also try to keep printing costs under control while maintaining quality. The production manager also determines how much it will cost to produce, for example, a 300-page textbook or an advertising insert in a magazine. In newspaper publishing, the production manager also oversees and controls the entire production operation.

Other production occupations found mainly in newspaper printing plants are *prepress technicians* and *printing machine operators*. Prepress technicians scan images and do page layout and camera work. They then process the film and make plates from it. Printing machine operators set up and run the printing presses and work with the inks. *Driver/sales workers* deliver the newspapers to newsstands and residential customers.

Sales, promotion, and marketing occupations. Magazines, newspapers, and directories, in particular, employ many *advertising sales agents*, who generate most of the revenue for these publications. Using demographic data produced by the market research department, they make presentations to potential clients promoting the use of their publication for advertising purposes. Increasingly, advertising agents sell integrated packages that include advertisements to be placed online or with a broadcast subsidiary, along with additional promotional tie-ins. This job can require substantial travel for some, while others may sell advertising over the telephone. Classified advertising sales are handled by *telemarketers* or *customer service representatives*, depending on who is making the call. *Advertising and promotions managers*, called circulation directors at some magazines and newspapers, study trends and devise promotion campaigns to generate new readers. They also work with the driver/sales workers to ensure that the publications are delivered on time.

Because books do not have advertising, book publishers generate sales through the use of publicity campaigns and a sales force. *Public relations specialists* promote books by setting up media interviews with authors and book signings, and by placing advertisements in relevant publications. *Sales representatives* go to places such as libraries, schools, and bookstores to promote the sale of their books.

General administration occupations. The publishing industry, as with most industries, has a variety of *general managers*, *accountants*, and administrative support staff who help to run the company. There are also *computer specialists* to keep the computer systems running and to implement new technologies. Others work as Internet site developers, who work with the design, editorial, and production departments in order to implement content changes and redesigns of Web sites operated by the publication. But the industry also has other occupations that are unique or important to its operations. For example, publishers are the *chief executives* of the company. Publishers are in charge of the business side of the organization and are responsible for implementing company policies. Subsidiary rights and permissions personnel are *business operations specialists*, who negotiate the copyrights for material and also license to others the right to reproduce or reprint copyrighted material. *Stock clerks* and *order fillers* and *customer service representatives* keep track of

Table 2. Employment of wage and salary workers in publishing, except software, by occupation, 2002 and projected change, 2002-12

(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	714	100.0	-1.5
Management, business, and financial occupations	71	10.4	5.1
Top executives	17	2.4	1.7
Advertising, marketing, promotions, public relations, and sales managers	15	2.2	7.4
Operations specialties managers	14	2.1	4.9
Business operations specialists	11	1.6	9.4
Financial specialists	8	1.2	3.6
Professional and related occupations	191	28.2	5.7
Computer specialists	25	3.8	8.4
Art and design occupations	27	4.3	13.0
News analysts, reporters and correspondents	40	5.8	4.1
Editors	63	9.2	4.1
Writers and authors	11	1.7	4.1
Media and communication equipment occupations	8	1.0	-5.2
Sales and related occupations	103	14.5	0.0
Supervisors, sales workers	10	1.5	4.5
Advertising sales agents	49	7.1	4.1
Sales representatives, wholesale and manufacturing	14	2.1	4.1
Telemarketers	16	1.7	-22.2
Office and administrative support occupations	180	23.0	-8.7
Supervisors, office and administrative support workers	11	1.4	-10.7
Financial clerks	21	2.6	-9.2
Customer service representatives	21	3.1	4.1
Material recording, scheduling, dispatching, and distributing occupations	18	2.3	-8.1
Secretaries and administrative assistants	17	2.1	-13.8
Desktop publishers	14	2.4	20.6
Office clerks, general	22	2.7	-9.3
Production occupations	85	11.2	-6.2
Supervisors, production workers	9	1.3	4.1
Job printers	8	1.0	-4.5
Prepress technicians and workers	18	2.2	-14.5
Printing machine operators	19	2.5	-6.9
Other production occupations	18	2.4	-3.7
Transportation and material moving occupations	70	9.2	-6.0
Driver/sales workers	11	1.4	-6.3
Truck drivers, light or delivery services	12	1.7	1.0
Laborers and freight, stock, and material movers, hand	14	1.7	-14.5
Machine feeders and offbearers	11	1.4	-6.3
Packers and packagers, hand	11	1.5	-6.5

NOTE: May not add to totals due to omission of occupations with small employment.

books in publisher's warehouses and respond to customer inquiries. Lastly, as publications, particularly books, are published

in more than one format, workers are needed to develop the new formats. Audio books, for example, require *sound engineering technicians* to transfer the books to tape.

Training and Advancement

The ability to communicate well is one of the most important skills needed to enter the publishing industry. Although it is especially critical for those in the editorial and sales departments, it is also required for those in production, who may be called upon to compose text. Computer literacy also is becoming a requirement for almost everyone seeking work in this industry. And finally, the ability to meet tight deadlines is a must for most workers.

Writers, reporters, and editors generally need a bachelor's degree. Most people in these occupations majored in English, communication, or journalism. Some publishers, however, prefer graduates with liberal arts degrees or specific subject knowledge if the person will be writing about a certain topic or doing technical writing. For the most part, writers and editors need to be able to express ideas clearly and logically and to write under pressure. Familiarity with desktop publishing software is helpful.

Writers and editors often start as assistants, performing fact-checking, doing research, or copy editing along with clerical tasks. News reporters often start by covering local community events or criminal cases and advance to reporting regional or national news. Writers and reporters can advance to editorial positions, but some choose to continue writing and advance by becoming nationally known experts in their field.

A college degree is preferred for most advertising, sales, and marketing positions in which meeting with clients is required. Courses in marketing, communication, business, and advertising are helpful. For those who sell over the telephone, a high school degree may be sufficient. However, more important for success are excellent communication and interpersonal skills. Those in advertising and sales must be able to get along with others, as well as be self-motivated, well-organized, persistent, independent, and able to handle rejection. Enthusiasm and a sense of humor also help. One advance in these fields by taking on bigger, more important clients or by going into management.

Most prepress technicians and printing machine operators learn on the job by working alongside experienced craftworkers. Although a high school education is sufficient to get a job, taking classes in printing techniques or getting an associate's degree at a postsecondary institution will enhance one's credentials and make it easier to get a job and to advance. Computer skills and familiarity with publishing software packages are important because prepress work and printing are increasingly computerized. Training on new machines will be needed throughout one's career. Advancement usually comes by working on more complex printing jobs or by becoming a supervisor.

Most professional jobs in this industry require experience, especially if one wants to work for a top newspaper, magazine, or book publishing company. Experience can be obtained by working for a school newspaper or by performing an internship with a publishing company. However, most people start by working for small publishing companies or newspapers in smaller cities and towns and work their way up to better paying jobs with

larger newspapers or publishers. Others break into the field by doing freelance work.

Earnings

In 2002, average weekly earnings for workers in the publishing industry varied by type of publication. Average weekly earnings for those working in periodical publishing were \$595, for book publishing \$585, and in newspaper publishing \$483 compared with \$506 for all industries. Writers, editors, and reporters working on major metropolitan newspapers or those with technical expertise writing for specialized magazines usually have the highest salaries. Advertising sales representatives usually earn a base salary plus an amount based on sales. Earnings in selected occupations in publishing appear in table 3.

The Newspaper Guild is the major union representing most nonsupervisory employees in the newspaper industry.

Table 3. Median hourly earnings of the largest occupations in publishing, except software, 2002

Occupation	Publishing, except software	All industries
Editors	\$19.37	\$19.79
Printing machine operators	16.09	13.95
Advertising sales agents	15.83	18.11
Graphic designers	15.22	17.64
News analysts, reporters and correspondents	13.99	14.67
Desktop publishers	13.49	15.20
Prepress technicians and workers	13.07	14.98
Customer service representatives	12.98	12.62
Office clerks, general	10.88	10.71
Telemarketers	10.49	9.40
Laborers and freight, stock, and material movers, hand	9.08	9.48

Outlook

Over the period 2002-12, wage and salary employment in publishing, except software, is projected to decline by 1 percent, versus growth of 16 percent for all industries. As the need for news and information continues to grow, the publishing industry will be in the forefront. Books, newspapers, and magazines, produced in a variety of media, will be needed to keep people informed. However, efficiencies in production and a trend towards using more freelance writers will cause wage and salary employment to decline overall. Keen competition for jobs also can be expected for most writing and editing jobs, as this industry attracts a large number of applicants, especially at nationally known publications. Writers with specialized knowledge and those who can write on subjects appealing to minority and ethnic readers will have better job prospects.

The need for workers in the publishing industry also varies with the economy. When the economy is depressed, advertising declines and publishers look to cut costs and personnel. In addition, when the economy is down, State and local governments cut back on spending on books for schools and libraries.

Newspaper subscriptions have been declining for many years, as more people turn to television for much of their news. Many people also are turning to Internet news sites. In addition, as the population becomes more diverse and spread out, newspaper publishers are finding that their costs are going up as they attempt to increase readership by adding more stories of interest to

ethnic and suburban audiences. However, mergers in the industry have also made newspapers more efficient. Reporters and advertising agents can now write stories or sell advertising for several newspapers at once and multiple newspapers can now be printed at one location. Those working in company administration also are more productive. Although the number of mergers is expected to decline in the next decade, additional efficiencies are expected to decrease the number of people required to produce a newspaper. These efficiencies will be particularly apparent in the printing plants. As computerization of the printing process becomes widespread, more printing plates will be made directly from electronic images of publications' pages, which have been developed, stored, and transmitted by computer. Employment of prepress technicians and printing machine operators is expected to decline because fewer will be needed to operate the new computerized equipment.

It also is anticipated that the Federal Communications Commission will relax the rules banning ownership of television stations and newspapers in the same market. If this happens, workers may be required to work in both the broadcast and print mediums. Photographers, for example, will also have to learn to use video cameras.

Periodical and book publishing, along with miscellaneous publishing, will likely grow more slowly than in the past. Although mergers are becoming less frequent within the book publishing business, they are expected to continue in magazine publishing, leading to more efficiencies and reduced labor needs. However, several types of publishing should see increased growth. The segment of the industry producing textbooks is expected to benefit from a growing number of high school and college students over the next decade and the need to implement new learning standards in classrooms. Technical and scientific books and journals also will be needed to relay new discoveries to the public. Custom publishing, in which a magazine publisher produces customized newsletters and magazines for clients, also is expected to grow, as more businesses and organizations use magazines to promote new products and retain customer loyalty.

Job openings for advertising sales agents will be in rough balance with the supply of workers, as this occupation is subject to more turnover than most. The need for more sales agents to sell for a wider range of mediums will be offset, at least in part, by the fact that mergers have resulted in fewer advertising agencies to deal with.

The best job opportunities in the future will be for those who have good computer skills and can work in multiple mediums. Most newspapers and magazines, in particular, now have Web sites that are regularly updated. Some of these sites require additional writers, reporters, and editors to update content. The sites also need Web coders and designers and other computer experts to maintain the sites. The production of e-books, which are likely to grow in popularity over the next decade, will require people skilled in incorporating graphics and other digital inputs.

Technological advances will continue to eliminate and change jobs in this industry. Prepress technicians and postpress workers (inserters, material handlers, and bundlers) will continue to lose jobs to automation. The production jobs that remain will require computer and mathematical skills.

Sources of Additional Information

For information about careers in book publishing, write to:

- The Association of American Publishers, 71 Fifth Ave., New York, NY 10003. Internet: <http://www.publishers.org>

For information about careers in newspaper publishing, write to:

- The Newspaper Association of America, 1921 Gallows Rd., Suite 600, Vienna, VA 22182. Internet: <http://www.naa.org>

Information on most occupations in the publishing industry may be found in the 2004-05 *Occupational Outlook Handbook*. Among those occupations are:

- Advertising, marketing, promotions, public relations, and sales managers
- Artists and related workers
- News analysts, reporters, and correspondents
- Photographers
- Prepress technicians and workers
- Printing machine operators
- Writers and editors

SIGNIFICANT POINTS

- Employment is projected to increase 68 percent between 2002 and 2012, ranking software publishers as the fastest growing industry in the economy.
- Computer specialists account for half of all workers in this industry.
- Job opportunities will be excellent for most workers; professional workers enjoy the best prospects, reflecting continuing demand for higher level skills needed to keep up with changes in technology.

Nature of the Industry

All organizations today rely on computer and information technology to conduct business and operate more efficiently. Computer software is needed to operate and protect computer systems and networks. Some 8,200 establishments are engaged primarily in computer software publishing or publishing and reproduction. Software publishing establishments carry out operations necessary for producing and distributing computer software, such as designing, providing documentation, assisting in installation, and providing support services to software purchasers. These establishments may design, develop, and publish, or publish only. Establishments providing access to software for clients from a central host site, designing custom software to meet the needs of specific users, or involved in mass duplication of software are classified elsewhere. (For more information, see the statement on computer systems design and related services found elsewhere in the *Career Guide*.)

Software publishing establishments that design and publish prepackaged software may develop operating system software as well as word processing and spreadsheet packages, games and graphics packages, data storage software, and Internet-related software tools such as search engines and Web browsers—the software that permits browsing, retrieval, and viewing of content from the Internet. Some establishments may install the software package on a user's system and provide customer support.

Software is often divided into two main categories—applications software and systems software. Applications software includes individual programs for computer users—such as programs for word processing or for developing and maintaining spreadsheets and databases. Systems software, on the other hand, includes the operating system and all of the related programs that enable the computer to function. The Internet has vastly altered the complexion of the software industry over the last decade. Much applications and system software is developed for use on the Internet and for connections to the Internet.

Organizations are constantly seeking to implement technologies which will improve efficiency. Enterprise resource planning (ERP) software is such an example. ERP consists of cross-industry applications that automate a firm's business

processes. Common applications include human resources, manufacturing, and financial management software. Examples of more recent applications are software to manage customer relations and a firm's sources of supply, known as customer relationship management (CRM) and supply-chain management software. Enterprise resource planning software has traditionally been implemented by large organizations with vast computer networks.

Electronic business (e-business) is any process that a business organization conducts over a computer network. Electronic commerce (e-commerce) is that part of e-business that involves the buying and selling of goods and services. With the growth of the Internet and the expansion of e-commerce, there is significant demand for e-commerce software that enables businesses to become as efficient as possible.

This widespread use of the Internet and Intranets also has led to greater focus on the need for computer security. The robust growth of e-commerce increases this concern, as firms seek to attract as many potential customers as possible to their Web sites. Security threats range from damaging computer viruses to online credit card fraud. As a result, organizations and individual computer users are demanding software that secures their computer networks or individual computer environments. Examples of such software are firewalls and antivirus software.

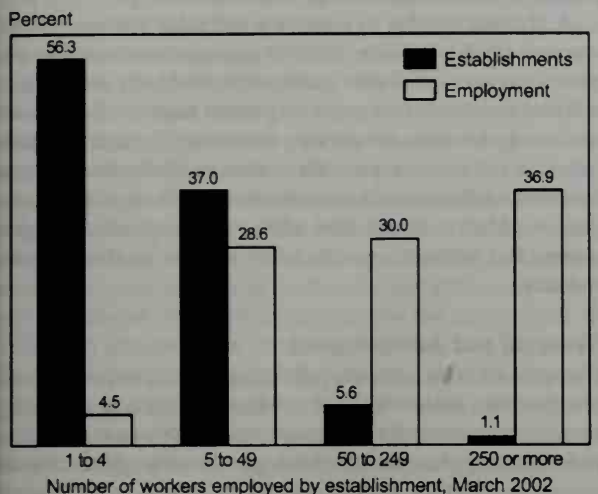
Working Conditions

Most workers in this industry work in clean, quiet offices. Given the technology available today, however, more work can be done from remote locations using modems, fax machines, e-mail, and especially the Internet.

About 9 percent of the workers in software publishing firms work part time, compared with 16 percent of workers throughout all industries. For some professionals, evening or weekend work may be necessary to meet deadlines or solve problems. Professionals working for large establishments may have less freedom in planning their schedule than do consultants for very small firms, whose work may be more varied.

Employees who work at video terminals for extended periods may experience musculoskeletal strain, eye problems, stress, or repetitive motion illnesses, such as carpal tunnel syndrome.

Less than 7 percent of the establishments in software publishing together account for two-thirds of the industry's jobs



Employment

In 2002, there were about 256,000 wage and salary jobs in the industry. While the industry has both large and small firms, the average establishment in software publishing is relatively small; over half of the establishments employed fewer than 5 workers. About two-thirds of jobs, however, are found in a small number of establishments that employ 50 or more workers (chart 1). Many small establishments in the industry are startup firms that hope to capitalize on a market niche.

Relative to the rest of the economy, there are significantly fewer workers 45 years of age and older in software publishing establishments; this industry's workforce remains younger than most, with large proportions of workers in the 25-to-44 age range (table 1). This reflects the industry's explosive growth in employment since the early 1980s. The huge increase in employment afforded numerous opportunities to younger workers possessing the latest technical skills.

Occupations in the Industry

Providing a wide array of information services to clients requires a diverse and well-educated workforce. The majority of work-

Table 1. Percent distribution of employment, by age group, 2002

Age group	Software publishers	All industries
Total	100.0%	100.0%
16-19	0	4.8
20-24	5.8	9.9
25-34	43.0	21.6
35-44	34.6	26.3
45-54	15.7	22.9
55-64	1.0	11.4
65 and older	0	3.2

ers in the software publishing industry are professional and related workers, such as computer software engineers and computer programmers (table 2). This occupational group accounts for nearly 60 percent of the jobs in the industry, reflecting the emphasis on high-level technical skills and creativity. By 2012, the employment share of professional and related occupations is expected to be even greater, while the employment share of office and administrative support jobs, currently accounting for 12 percent of industry employment, is projected to fall.

Programmers write, test, and maintain the detailed instructions, called programs or software, that computers must follow to perform their functions. These programs tell the computer what to do—which information to identify and access, how to process it, and what equipment to use. Programmers write these commands by breaking down each operation into a logical sequence of steps, converting the instructions for those steps into a language that the computer understands. While some still work with traditional programming languages like COBOL, object-oriented programming languages such as C++ and Java, computer-aided software engineering (CASE) tools, and artificial intelligence tools now are being used to create and maintain programs. These languages and tools allow portions of code to be reused in programs that require similar routines. Many programmers also customize purchased software or create better software to meet a client's specific needs.

Computer software engineers design, develop, test, and evaluate software programs and systems. Although programmers write and support programs in new languages, much of the design and development now is the responsibility of *software engineers* or *software developers*. Software engineers must possess strong programming skills, but are more concerned with developing algorithms and analyzing and solving programming problems than with actually writing code. These professionals develop many types of software, including operating systems software, network distribution software, and a variety of applications software. *Computer systems software engineers* coordinate the construction and maintenance of a company's computer systems, and plan their future growth. They develop software systems for control and automation in manufacturing, business, and other areas. They research, design, and test operating system software, compilers—software that converts programs for faster processing—and network distribution software. *Computer applications software engineers* analyze users' needs and design, create, and modify general computer applications software or specialized utility programs. They analyze user needs and develop software solutions. Video game programmers are software engineers who plan and write video game software.

Computer support specialists provide technical assistance, support, and advice to customers and users. This group of occupations includes workers with a variety of titles, such as *technical support specialists* and *help-desk technicians*. These troubleshooters interpret problems and provide technical support for software and systems. Support specialists may work either within a company or other organization or directly for a computer software vendor. They answer telephone calls, analyze problems using automated diagnostic programs, and resolve difficulties encountered by users.

Other computer specialists include a wide range of professionals who specialize in operation, analysis, education, application, or design for a particular piece of the system. Many are involved in the design, testing, and evaluation of network systems such as local area networks (LAN), wide area networks

Table 2. Employment of wage and salary workers in software publishing industry by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	256	100.0	67.9
Management, business, and financial occupations	48	18.9	71.6
Top executives	7	2.8	64.4
Marketing managers	3	1.3	67.9
Sales managers	3	1.2	82.1
Computer and information systems managers	9	3.3	81.9
Financial managers	2	0.9	68.0
Engineering managers	2	0.9	68.0
Management analysts	4	1.4	68.0
All other business operations specialists	3	1.3	83.3
Accountants and auditors	3	1.3	67.2
Professional and related occupations	150	58.7	73.8
Computer programmers	22	8.5	43.3
Computer software engineers, applications	41	15.8	82.9
Computer software engineers, systems software	18	7.2	91.0
Computer support specialists	21	8.0	68.0
Database administrators	2	0.8	92.4
Computer systems analysts	9	3.5	81.2
Network and computer systems administrators	5	1.8	81.2
Network systems and data communications analysts	3	1.2	105.9
All other computer specialists	6	2.5	82.5
Market research analysts	4	1.4	69.7
Multimedia artists and animators	3	1.1	68.0
Technical writers	3	1.3	68.0
Sales and related occupations	22	8.8	50.6
Sales representatives, wholesale and manufacturing, technical and scientific products	7	2.9	34.4
Sales representatives, wholesale and manufacturing, except technical and scientific products	3	1.2	68.0
Sales engineers	3	1.1	68.0
Telemarketers	3	1.3	25.6
All other sales and related workers	3	1.3	68.0
Office and administrative support occupations	32	12.4	47.2
Bookkeeping, accounting, and auditing clerks	2	0.9	43.3
Customer service representatives	7	2.7	68.0
Secretaries and administrative assistants	7	2.7	41.1
Office clerks, general	3	1.0	46.3

NOTE: May not add to totals due to omission of occupations with small employment.

(WAN), the Internet, and other data communications systems. Specialty occupations reflect an emphasis on client-server applications and end-user support; however, occupational titles shift rapidly to reflect new developments in technology.

A growing number of marketing and sales workers also are employed in this industry. In order to compete successfully and gain customers and clients in the online world, the presentation and features of software and other content related to information technology becomes increasingly important. For example, publishers of software that provides connections to the Internet must be able to differentiate their products from those of their competitors. Marketing and sales workers are responsible for promoting and selling the products and services produced by the industry.

Training and Advancement

Occupations in the software publishing industry require varying levels of education. The level of education and type of training required depend on the employer's needs. One factor affecting these needs is changes in technology. As demonstrated by the current demand for workers with skills related to the Internet and computer security, employers often scramble to find workers capable of implementing "hot" new technologies. Another factor driving employers' needs is the timeframe within which a project must be completed.

Computer programmers commonly hold a bachelor's degree; however, there are no universal educational requirements. Some hold a degree in computer science, mathematics, or information systems, while others have taken special courses in computer programming to supplement their study in fields such as accounting, inventory control, or other areas of business. Because employers' needs are so varied, a 2-year degree or certificate may be sufficient for some positions so long as applicants possess the right technical skills.

Most computer software engineers have at least a bachelor's degree and broad knowledge and experience with computer systems and technologies. Usual degree concentrations for applications software engineers are computer science or software engineering; for systems software engineers, usual concentrations are computer science or computer information systems. Graduate degrees are preferred for some of the more complex software engineering jobs.

Persons interested in becoming a computer support specialist generally need only an associate degree in a computer-related field, as well as significant hands-on experience with computers. They also must possess strong problem-solving and analytical skills as well as excellent communication skills because troubleshooting and helping others are such vital parts of the job. And because there is constant interaction on the job with other computer personnel, customers, or employees, computer support specialists must be able to communicate effectively on paper, using e-mail, or in person. They also must possess strong writing skills when preparing manuals for employees and customers. As technology continues to improve, computer support specialists must constantly strive to stay up to date and acquire new skills if they wish to remain in the field.

The size of the firm and the local demand for workers also may influence training requirements for specific jobs. Smaller

firms may be willing to train informally on the job, whereas larger organizations may pay for formal training or higher education. For example, many marketing and sales workers are able to secure entry-level jobs with little technical knowledge but quickly acquire knowledge of their company's products and services through on-the-job training. With more formal education, employees may advance to completely different jobs within the industry. Education or training in a specialty area, such as information security, may provide new opportunities for the worker and allow the establishment to offer new services.

Continuing technological advances in the computer field have led to demand for workers with a higher level of skill and expertise. Employers, hardware and software vendors, colleges and universities, private training institutions, and professional computing societies offer continuing education and professional development seminars. The Institute of Electrical and Electronics Engineers Computer Society, for example, recently created a certification process for software development professionals who possess a bachelor's degree and work experience that demonstrates a body of knowledge, and who pass a written examination.

Software publishing offers advancement opportunities for all workers who keep up with changing technology. For example, computer support specialists may move into computer programmer positions and, later, into computer software engineer jobs. This advancement usually results from work experience and continued training and education.

Entry-level computer programmers usually start working with an experienced programmer to update existing code, generate lines of one portion of a larger program, or write relatively simple programs. They then advance to more difficult programming and may become project supervisors, or move into higher management positions within the organization. Many programmers who work closely with systems analysts advance to systems analyst positions.

Computer software engineers who show leadership ability also can become project managers or advance into management positions, such as manager of information systems or even chief information officer. Technical support specialists may advance by developing expertise in a particular program or software that can lead to opportunities as a programmer or software engineer.

Many experienced workers also have opportunities to move into sales positions as they gain knowledge of specific products and services. Computer programmers who write accounting software, for example, may use their specialized knowledge to sell such products to similar firms. Also, computer support specialists providing technical support for an operating system may eventually market that product, based on their experience and knowledge of the system.

Earnings

Employees in the software publishing industry generally command higher earnings than the national average. All production or nonsupervisory workers in the industry averaged \$1,258 a week in 2002, significantly higher than the average of \$506 for all industries. This reflects the concentration of professionals and specialists who often are highly compensated for their skills or

Table 3. Median hourly earnings of the largest occupations in software publishing, 2002

Occupation	Software publishers	All industries
General and operations managers	\$58.02	\$32.80
Computer and information systems managers	48.85	40.98
Computer software engineers, systems software	37.08	35.60
Computer software engineers, applications ..	36.75	34.09
Sales representatives, wholesale and manufacturing, technical and scientific products	34.60	26.80
Computer programmers	32.15	28.98
Computer specialists, all other	31.80	26.00
Computer systems analysts	31.38	30.24
Computer support specialists	20.61	18.80
Executive secretaries and administrative assistants	18.37	16.06
Customer service representatives	14.77	12.62

expertise. Given the pace at which technology advances in this industry, earnings can be driven by demand for specific skills or experience. Earnings in selected occupations in software publishing appear in table 3.

As one might expect, education and experience influence earnings as well. For example, annual earnings of computer software engineers ranged from less than \$47,160 for the lowest 10 percent to more than \$114,630 for the highest 10 percent in 2002. Managers usually earn more because they have been on the job longer and are more experienced than their staffs, but their salaries, too, can vary by level and experience. Accordingly, annual earnings of computer and information systems managers ranged from less than \$62,380 for the lowest 10 percent to more than \$145,600 for the highest 10 percent in 2002. Earnings also may be affected by size, location, and type of establishment, hours and responsibilities of the employee, and level of sales.

Outlook

Employment in the software publishing industry has more than doubled over the past decade, 1992-2002. Despite the recent economic downturn among firms involved in information technology, software publishing is, nevertheless, projected to be the fastest growing industry in the U.S. economy over the next decade. Wage and salary employment is expected to increase by 68 percent between 2002 and 2012, more than four times the 16 percent growth projected for all industries combined. Even in difficult economic times, organizations continue to make investments in software. Software boosts productivity, increases efficiency, and, in some cases, reduces the need for workers. Growth will not be as rapid as it was during the previous decade, however, as the software industry begins to mature and as routine work is increasingly outsourced overseas.

An increasing reliance on information technology, combined with falling prices of computers and related hardware, means that individuals and organizations will continue to invest in applications and systems software to maximize the return on their investments in equipment and to fulfill their growing computing needs. Such needs include the expansion of electronic commerce,

a growing reliance on the Internet, faster and more efficient and secure internal and external communication, and the development of new technologies and applications. Given the rate at which the software publishing industry is expected to grow, and the increasing integration and application of software in all sectors of the economy, job opportunities should be excellent for most workers. Professional workers should enjoy the best opportunities, reflecting employers' continuing demand for higher level skills to keep up with changes in technology. However, employment growth may be tempered somewhat as companies contract out more of the routine tasks to foreign countries, where labor costs are lower, in an attempt to remain competitive.

Today, there is demand for software products ranging from Web browsers, home networking software, and firewalls to maintain security to video games and other entertainment-related software products. Yet, new growth areas will continue to arise from rapidly evolving technologies and business forces. The increasing uses of the Internet, the proliferation of websites, and mobile technology such as the wireless Internet have created demand for a wide variety of new software. The market for educational software and entertainment software, which includes video games, is also expected to experience robust growth over the next decade.

The way the Internet is used is constantly changing, and so is the software required to run the new and emerging computer applications. Expanding electronic commerce, for example, has changed the way companies transact business. Business-to-business commerce is automating many steps in the transaction of business between companies, allowing many firms to operate more efficiently. Businesses are moving their supply networks online and participating in and developing online marketplaces. The sustained growth of electronic commerce as well as the growing uses of intranets and extranets will drive demand for increasingly sophisticated software tools geared towards these technologies. And, as the amount of electronic information stored and accessed continues to grow, new applications and security needs will increase demand for database software. Demand for an even wider array of software applications also should increase as companies continue to expand their capabilities, integrate new technologies, and develop new applications.

One significant factor contributing to growth in software is

computer security. Organizations invest heavily in software to protect their information and secure their systems from attack. And, as more individuals and organizations are conducting business electronically, the importance of maintaining computer system and network security will increase, leading to greater demand for security software.

Given the increasingly widespread use of information technologies and the overall rate of growth expected for the software publishing industry, most occupations should grow very rapidly, although some faster than others. The most rapid job increases will occur among computer specialists such as computer software engineers, as firms continue to install sophisticated computer networks, set up Internet and intranet sites, and engage in electronic commerce, and as consumers continue to explore and use vast amounts of applications software.

Sources of Additional Information

Further information about computer careers is available from:

- Association for Computing Machinery (ACM), 1515 Broadway, New York, NY 10036.
Internet: <http://www.acm.org>
- Institute Electrical and Electronics Engineers Computer Society, Headquarters Office, 1730 Massachusetts Ave. NW., Washington, DC 20036-1992.
Internet: <http://www.computer.org>
- National Workforce Center for Emerging Technologies, 3000 Landerholm Circle SE., Bellevue, WA 98007.
Internet: <http://www.nwecet.org>

Information on the following occupations can be found in the 2004-05 *Occupational Outlook Handbook*:

- Computer and information systems managers
- Computer programmers
- Computer software engineers
- Computer support specialists and systems administrators
- Computer systems analysts, database administrators, and computer scientists

Telecommunications

(NAICS 517)

SIGNIFICANT POINTS

- Telecommunications includes voice, video, and Internet communications services.
- Job growth will be limited by overcapacity, technological advances, mergers, and contracting out.
- With rapid technological changes in telecommunications, those with up-to-date technical skills will have the best job opportunities.
- Average earnings in telecommunications greatly exceed average earnings throughout private industry.

Nature of the Industry

Changes in technology, government regulation, and market conditions continue to transform the telecommunications industry. Whereas voice telephone communication was once the primary service of the industry, the transmission of a variety of information, including data, graphics, and video, is now commonplace. The widespread installation of fiber optic cables, which transmit light signals along glass strands, permits faster, higher capacity transmissions than those possible with traditional copper wirelines. In addition, networks of radio towers provide wireless telecommunications services. In the previous *Career Guide*, telecommunications and cable and other pay television services were described in separate sections. The convergence of the services provided by traditional telecommunications companies and cable companies has led to the combination of those sections into this one statement.

Changes in government regulation introduced competition into an industry that was once dominated by a single company. Competition from outside the industry increased as cable companies and public utilities expanded their own communications networks. During the late 1990s, the growth of the Internet, advances in a range of technologies, the deregulation of the telecommunications industry, and rapid increases in demand for telecommunications services helped fuel rapid growth. Consequently, many new competitors entered the markets and built additional transmission capacity. The massive investments in additional capacity by new competitors and existing companies eventually caused supply to significantly exceed demand, resulting in much lower prices for transmission capacity. The excess capacity and additional competition led to either declining revenues or slowing revenue growth, which caused many companies to reduce employment.

The principal sector of the telecommunications industry is telephone communications. Establishments in this sector operate both wireline and wireless networks. Wireline networks use wires and cables to connect customers' premises to central offices maintained by telecommunications companies. Central offices contain switching equipment that routes content to its final destination or to another switching center. For example, switching equipment may route local telephone calls directly from

the central office to their final destination; long-distance calls are routed to larger switching centers that determine the most efficient route for the call to take.

Wireless networks operate through the transmission of signals over networks of radio towers. For example, a wireless cellular telephone transmits radio signals to an antenna located on a radio tower. The signal is then transmitted through the antenna into the wireline network. Other wireless services include beeper, paging, and Internet access. Because these devices require no wireline connection, they are popular with customers who need to communicate as they travel, residents of areas with inadequate wireline service, and those who simply desire the convenience of portable communications. Increasing numbers of consumers are choosing to replace their home landlines with wireless phones.

Wireless providers plan to deploy additional technology called third generation (3G) wireless access. Conventional wireless Internet access is relatively slow, allowing cellular phones to display only limited amounts of text-based information. A 3G system allows higher speed data transmission and better Internet access. Fixed wireless service, which involves connecting the telephone and/or Internet wiring system in a home or business to an antenna, instead of a telephone line, is another source of competition. The replacement of landlines with cellular service should become increasingly common because 3G wireless will provide a level of service closer to that of landline systems.

The wireline sector also includes resellers of telecommunications services who compete with traditional local telephone service providers. These resellers lease transmission facilities, such as telephone lines, from existing telecommunications networks, and then resell the service to other customers. Other sectors in the industry include message communications services, such as e-mail and facsimile services, and operators of other communication services, ranging from radar stations to radio networks used by taxicab companies.

Voice telephone communications have long been the predominant service offered by telephone companies. With the rising popularity of the Internet, however, customers increasingly use their telephone service to transmit data and other electronic materials. The transmission of such content relies on digital tech-

nologies that use telecommunications networks more efficiently than do conventional systems. Digital signals consist of separate pieces of electronic code that can be broken apart during transmission and then reassembled at the destination. Telecommunications providers have built networks of computerized switching equipment, called packet switched networks, to route digital signals. Packet switches break the signals into small segments or "packets" and provide each with the necessary routing information. Segments may take separate paths to their destination and may share the paths with packets from other users. At the destination, the segments are reassembled, and the transmission is complete. Because packet switching considers alternate routes, and allows multiple transmissions to share the same route, it results in a more efficient use of telecommunications capacity. Voice communications are normally split up and reassembled by telecommunications companies' switching and routing equipment. An increasingly popular option for businesses, which should eventually become more common in residential communications, is called Voice over Internet Protocol (VoIP). VoIP splits up the conversation into packets in the telephone, transmitting the conversation over the Internet. The telephone has an Internet address at which it receives and reassembles packets into voice communications.

The transmission of voice signals requires relatively small amounts of capacity on telecommunications networks. By contrast, the transmission of data, video, and graphics requires much higher capacity. This transmission capacity is referred to as bandwidth. As the demand increases for high-capacity transmissions—especially with the rising volume of Internet data—telecommunications companies have expanded and upgraded their networks to increase the amount of available bandwidth.

Wireline providers have massively expanded their networks by laying additional fiber optic cable, which provides higher bandwidth and transmission speed than does copper wire. The capacity of fiber optic cables is increasing due to advances in transmission speed and improvements in technologies such as wavelength division multiplexing (WDM). Within each glass fiber optic line within a cable, WDM uses the different colors of the spectrum; each color can carry a separate stream of data, increasing overall capacity. Providers also offer upgraded service on the copper wirelines that connect most residential customers with central offices. Technologies such as digital subscriber lines (DSL) allow simultaneous transmission of voice and data communications at relatively high speeds.

Changes in technology and regulation now allow cable and satellite television providers to compete with telephone companies. An important change has been the rapid increase in two-way communications capacity. Conventional pay television services provided communications only from the distributor to the customer. These services could not provide effective communications from the customer back to other points in the system, due to signal interference and the limited capacity of conventional cable systems. Cable operators implemented new technologies to reduce signal interference. The capacity of distribution systems also has increased, due to the installation of fiber optic cables and improved data compression. As a result, some pay television systems now offer two-way telecommunications services, such as telephone service and high-speed Internet access. The

high cost of building cable telephony systems has limited growth. New technologies being developed to reduce construction costs should help overcome this problem.

Cable and other program distribution is another sector of the telecommunications industry. Establishments in this sector provide television and other services on a subscription or fee basis. These establishments do not include cable networks. (Information on cable networks is included in the statement on broadcasting, which appears elsewhere in the *Career Guide*.) Distributors of pay television services transmit programming through two basic types of systems. Cable systems transmit programs over fiber optic and coaxial cables. Direct broadcasting satellite (DBS) operators constitute a rapidly growing segment of the pay television industry. DBS operators transmit programming from orbiting satellites to customer receivers, known as minidishes. The dishes are about 18 inches in diameter, although newer dishes that provide Internet access are slightly larger.

Establishments in this industry generate revenue through subscriptions, special service fees, and advertising sales. Pay television systems charge installation and subscription fees to set up and provide service. They also charge fees for special services, such as the transmission of specialty pay-per-view or video-on-demand programs; these often are popular movies or sporting events.

Subscription television services are widely used. In 2002, more than 80 percent of households with television sets received pay television services. Most of these customers subscribed to cable service; however, subscriptions to satellite services are growing rapidly.

Some upgraded systems facilitate the transmission of digital television signals. Digital signals consist of simple electronic code that can carry more information than conventional television signals. Digital transmission creates higher resolution television images and improved sound quality. It also allows the transmission of a variety of other information. Another feature of digital television is more channels, thanks to compression technology.

Satellite-based systems have experienced rapid growth, with more than 19 million subscribers in 2002. The growth of the satellite subscription industry stems from several factors. Prices for minidish subscriptions have dropped dramatically, and are now competitive with cable. In addition, regulatory changes allowed satellite services to begin carrying local network channels. Most recently, satellite services have begun offering Internet access.

Working Conditions

The telecommunications industry offers steady, year-round employment. Overtime sometimes is required, especially during emergencies such as floods or hurricanes when employees may need to report to work with little notice.

Telecommunications line installers and repairers work in a variety of places, both indoors and outdoors, and in all kinds of weather. Their work involves lifting, climbing, reaching, stooping, crouching, and crawling. They must work in high places such as rooftops and telephone poles, or below ground when working with buried lines. Their jobs bring them into proximity with electrical wires and circuits, so they must take precautions

to avoid shocks. These workers must wear safety equipment when entering manholes, and test for the presence of gas before going underground.

Telecommunications equipment installers and repairers, except line installers, generally work indoors—most often in a telecommunication company's central office or a customer's place of business. They may have to stand for long periods; climb ladders; and do some reaching, stooping, and light lifting. Adherence to safety precautions is essential to guard against work injuries such as minor burns and electrical shock.

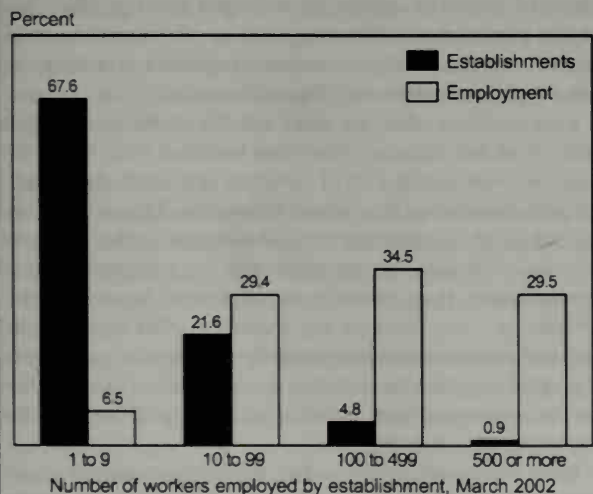
Most communications equipment operators, such as telephone operators, work at video display terminals in pleasant, well-lighted, air-conditioned surroundings. If the worksite is not well designed, however, operators may experience eye strain and back discomfort. The rapid pace of the job and close supervision may cause stress. Some workplaces have introduced innovative practices among their operators to reduce job-related stress.

The number of disabling injuries in telephone communications, the principal sector of the telecommunications industry, has been well below the average for all industries in past years. In 2001, cases of work-related injury and illness were 3.0 per 100 full-time workers, significantly lower than the 5.3 per 100 full-time workers for the entire private sector.

Employment

The telecommunications industry provided 1.2 million wage and salary jobs in 2002. Most telecommunications employees work in large establishments. Sixty-four percent of employment is in establishments with 100 or more employees (chart 1). With continuing deregulation, however, the number of small contractors has been increasing. Telecommunications jobs are found in almost every community, but most employees work in cities that have large concentrations of industrial and business establishments.

Nearly 2 out of 3 workers in telecommunications are employed in establishments with 100 or more workers



Occupations in the Industry

Although the telecommunications industry employs workers in many different occupations, 56 percent of all workers are employed in either office and administrative support occupations or installation, maintenance, and repair occupations (table 1).

Telephone craftworkers install, repair, and maintain telephone equipment, cables and access lines, and telecommunications systems. These workers can be grouped by the type of work

Table 1. Employment of wage and salary workers in telecommunications by occupation, 2002 and projected change, 2002-2012
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,201	100.0	6.7
Management, business, and financial occupations	176	14.7	11.6
Top executives	20	1.6	14.7
Advertising, marketing, promotions, public relations, and sales managers	14	1.2	24.9
Operations specialties managers	24	2.0	15.2
Management analysts	13	1.0	-1.0
Financial specialists	18	1.5	13.5
Professional and related occupations	169	14.1	14.5
Computer software engineers	26	2.2	15.1
Computer support specialists	12	1.0	14.7
Network and computer systems administrators	14	1.2	16.9
Electrical and electronics engineers	24	2.0	10.8
Electrical and electronic engineering technicians	16	1.3	4.3
Sales and related occupations	164	13.7	16.3
First-line supervisors/managers of non-retail sales workers	15	1.2	9.1
Retail salespersons	23	1.9	29.4
Sales representatives, wholesale and manufacturing	42	3.5	22.1
Telemarketers	20	1.7	-16.7
Office and administrative support occupations	364	30.3	0.2
First-line supervisors/managers of office and administrative support workers	29	2.4	-1.4
Telephone operators	38	3.1	-57.3
Bill and account collectors	13	1.1	10.3
Customer service representatives	134	11.1	20.4
Production, planning, and expediting clerks	12	1.0	4.0
Secretaries and administrative assistants	18	1.5	-3.1
Office clerks, general	30	2.5	-2.6
Installation, maintenance, and repair occupations	312	26.0	2.0
First-line supervisors/managers of mechanics, installers, and repairers	25	2.1	9.4
Telecommunications equipment installers and repairers, except line installers	152	12.7	-6.9
Telecommunications line installers and repairers	91	7.6	12.2

NOTE: May not add to totals due to omission of occupations with small employment.

they perform. *Line installers and repairers* connect central offices to customers' buildings. They install poles and terminals, and place wires and cables that lead to a consumer's premises. They use power-driven equipment to dig holes and set telephone poles. Line installers climb the poles or use truck-mounted buckets (aerial work platforms) and attach the cables using various handtools. After line installers place cables on poles or towers or in underground conduits and trenches, they complete the line connections.

Telecommunications equipment installers and repairers, except line installers, install, repair, and maintain the array of increasingly complex and sophisticated communications equipment and cables. Their work includes setting up, rearranging, and removing the complex switching and dialing equipment used in central offices. They may also solve network-related problems and program equipment to provide special features.

Some telecommunications equipment installers are referred to as telephone station installers and repairers. They install, service, and repair telephone systems and other communications equipment on customers' property. When customers move or request new types of service, such as a high-speed Internet connection, a fax, or an additional line, installers relocate telephones or make changes in existing equipment. They assemble equipment and install wiring. They also connect telephones to outside service wires and sometimes must climb poles or ladders to make these connections.

Cable installers travel to customers' premises to set up pay television service so that customers can receive programming. Cable service installers connect a customer's television set to the cable serving the entire neighborhood. Wireless and satellite service installers attach antennas or satellite dishes to the sides of customers' houses. These devices must be positioned to provide clear lines of sight to satellite locations. (Satellite installation may be handled by employees of retail stores that sell satellite dishes. Such workers are not employed by cable and other pay television services.)

Installers check the strength and clarity of the television signal before completing the installation. They may need to explain to the subscriber how pay television services operate. As these services expand to include telephone and high-speed Internet access, an understanding of the basic technology and an ability to communicate that knowledge are increasingly important.

Telephone operators make telephone connections, assist customers with specialized services such as reverse-charge calls, provide telephone numbers, and may provide emergency assistance.

Customer service representatives help customers understand the new and varied types of services offered by telecommunications providers. Some customer service representatives also are expected to sell services and may work on a commission basis. Other administrative support workers include *financial, information, and records clerks; secretaries and administrative assistants; and first-line supervisors/managers of office and administrative support workers*. These workers keep service records, compile and send bills to customers, and prepare statistical and other company reports, among other duties.

Fourteen percent of the industry's employees are professional workers. Many of these are scientific and technical personnel such as engineers and computer specialists. *Engineers* plan cable and microwave routes, central office and PBX equipment installations, and the expansion of existing structures, and solve other engineering problems. Some engineers also engage in research and development of new equipment. Many specialize in telecommunications design or voice, video, or data communications systems, and integrate communications equipment with computer networks. They work closely with clients, who may not understand sophisticated communications systems, and design systems that meet their customers' needs. *Computer software engineers and network systems and data communications analysts* design, develop, test, and debug software products. These include computer-assisted engineering programs for schematic cabling projects; modeling programs for cellular and satellite systems; and programs for telephone options, such as voice mail, e-mail, and call waiting. Telecommunications specialists coordinate the installation of these systems and may provide followup maintenance and training. In addition, the industry employs many other managerial, professional, and technical workers, such as *financial information and record clerks; accountants and auditors; human resources, training, and labor relations managers; engineering technicians; and computer programmers*.

Fourteen percent of the industry's employees are in sales and related occupations. These workers sell telecommunications services, such as long-distance service, personal answering services, voice mail, e-mail, and call-waiting telephone options.

New occupational specialties have emerged based on the industry's innovations and new technologies. For example, some engineers research, design, and develop gas lasers and related equipment needed to send messages through fiber optic cable transmission. They study the limitations and uses of lasers and fiber optics; find new applications for them; and oversee the building, testing, and operations of the new applications.

Training and Advancement

The telecommunications industry offers employment in jobs requiring a variety of skills and training. Many jobs require a high school education in addition to on-the-job training. Other jobs require particular skills that may take several years of experience to learn completely. For some managerial and professional jobs, employers require a college education.

Line installers often are hired initially as helpers, grounds workers, or tree trimmers who clear branches from lines. Because the work entails a lot of climbing, applicants should have physical stamina and be unafraid of heights. The ability to distinguish colors is important because wires and cables are coded by color. Although line installers may not complete a formal apprenticeship, they generally receive several years of on-the-job training. Line installers may transfer to other highly skilled jobs, such as telecommunications equipment installer and repairer, or may move into other kinds of work, such as sales. Promotion to crew supervisor, technical staff, or instructor of new employees also is possible.

Most companies prefer to hire telecommunications equipment installers and repairers with postsecondary training in elec-

tronics; some choose to hire persons with experience as line installers. Training sources include 2- and 4-year college programs in electronics or communications, trade schools, and training provided by telecommunications companies and/or equipment and software manufacturers. Telecommunications equipment installers and repairers may advance to jobs maintaining more sophisticated equipment or to engineering technician positions.

Communications equipment operators should have clear speech and good hearing; computer literacy and keyboarding skills also are important. New operators learn equipment operation and procedures for maximizing efficiency. Instructors monitor both the time and quality of trainees' responses to customer requests. Formal classroom instruction and on-the-job training may last several weeks.

A bachelor's degree in engineering usually is required for entry-level jobs as electrical and electronics engineers. Continuing education is important for these engineers; those who fail to keep up with the rapid changes in technology risk technological obsolescence, which makes them more susceptible to layoffs or, at a minimum, more likely to be passed over for advancement.

While there is no universally accepted way to prepare for a job as a computer professional, most employers place a premium on some formal college education. Computer software engineers usually hold a degree in computer science or in software engineering. For systems analyst, computer scientist, or database administrator positions, many employers seek applicants who have a bachelor's degree in computer science, information science, or management information systems.

Due to the rapid introduction of new technologies and services, the telecommunications industry is among the most rapidly changing in the economy. This means workers must keep their job skills up to date. From managers to communications equipment operators, increased knowledge of both computer hardware and software is of paramount importance. Several major companies and the telecommunications unions have created a Web site that provides free training for employees, enabling them to keep their knowledge current and helping them to advance. Telecommunications industry employers now look for workers with knowledge of and skills in computer programming and software design; voice telephone technology, known as telephony; laser and fiber optic technology; wireless technology; and data compression. Individuals with sales ability enhanced by interpersonal skills and knowledge of telecommunications terminology also are sought.

Earnings

Average weekly earnings of nonsupervisory workers in the telecommunications industry were \$761 in 2002, significantly higher than average earnings of \$506 in private industry. Table 2 presents earnings in selected occupations in telecommunications in 2002.

Twenty-four percent of employees in the industry are union members or covered by union contracts, compared with about 15 percent for all industries. Most telecommunications employees belong to 1 of 2 unions—the Communications Workers of America or the International Brotherhood of Electrical Workers.

Table 2. Median hourly earnings of the largest occupations in telecommunications, 2002

Occupation	Telecommunications	All industries
Managers, all other	\$34.41	\$32.16
First-line supervisors/managers of mechanics, installers, and repairers ...	27.84	22.87
First-line supervisors/managers of office and administrative support workers	23.83	18.66
Telecommunications equipment installers and repairers, except line installers	23.68	22.78
Telecommunications line installers and repairers	22.10	19.06
Sales representatives, wholesale and manufacturing, except technical and scientific products	18.21	20.54
Office clerks, general	16.80	10.71
Telephone operators	15.89	13.75
Customer service representatives	15.33	12.62
Retail salespersons	12.52	8.51

Outlook

Employment in the telecommunications industry is expected to increase 7 percent over the 2002-12 period, somewhat less than the 16 percent projected for all industries combined. Currently, excess transmission capacity and significant debt among telecommunications firms should limit employment. However, rising demand for telecommunications services will eventually result in a resumption of job growth in the industry.

Increases in both residential and business demand for high-capacity communications will eventually lead to upgrades of telecommunications networks. Rapidly increasing wireless demand, and the construction of a new generation of wireless systems, will help the wireless portion of the industry. However, technological improvements, such as fiberoptic lines and advanced switching equipment, have massively increased the data transmission capacity of telecommunications networks, and the resulting productivity gains have limited employment growth. Individuals with up-to-date technical skills should have the best employment opportunities.

Residential demand will increase as technology and competition lower the price of premium services, such as high-speed Internet access, video-on-demand, and wireless telephone service. The lower prices resulting from increasing capacity and competition will continue to limit revenues, curbing employment growth. Demand also will increase because deregulation has allowed providers to offer combined services, making it easier for households to obtain a wide variety of telecommunications services. Wireless carriers are competing directly with the residential service business, providing increasingly reliable cellular service and Internet service. Therefore, the lines between cable and satellite TV, wireless, and wireline telephone systems will become blurred.

Business demand will rise as companies increasingly rely on their telecommunications systems to conduct electronic commerce. In order to remain competitive, businesses will require higher speed access to the Internet for a variety of purposes including purchasing, marketing, sales, and customer service, but the increased demand will not result in significant employment gains. Some employment loss will result from improved

laborsaving technologies, such as self-monitoring equipment, and from layoffs due to mergers and consolidation in the deregulated industry.

Technology will continue to transform the industry. The installation and upgrading of fiber optic networks will bring ever-faster communications closer to residential customers. Internet telephony, which transmits voice, video, fax, and e-mail communications over the Internet, will blur the boundaries between telecommunications providers and Internet service providers. Wireless providers will continue to increase the capacity of their radio networks and introduce improved portable, lightweight devices capable of transmitting voice, data, and video. Undersea cables and orbiting satellites are integrating wireline and wireless customers into a global system of high bandwidth communications. The installation of computerized switching systems designed for digital content makes transmitting data, video, and graphics as easy as making voice telephone calls.

The removal of competitive barriers has increased competition from providers outside the traditional telecommunications industry. Cable TV providers are using their wireline networks to offer customers a combination of services including telephone service, Internet access, and cable TV programming. With advances in VoIP technology, cable companies will offer voice telephone communications to more customers. These same advances to their networks will allow them to offer more channels of pay-per-view and, in some cases, true video-on-demand. Satellite TV providers also are offering Internet access.

Employment growth will differ among the various occupations in the telecommunications industry, largely as a result of technology change. Employment of communications equipment operators is expected to decline due to increasing automation. Computer voice recognition technology lessens the need for central office operators, as customers can obtain help with long-distance calls from automated systems. This technology, which also enables callers to request numbers from a computer instead of a person, is expected to reduce the number of directory assistance operators. The numbers of these workers may drop further as more customers use automated directory assistance resources on the Internet.

Employment of line installers and repairers is expected to grow as telecommunications providers maintain and expand their networks in response to customer demand. Businesses will request more wireline installations to provide increased connections to suppliers and customers. Residential customers who are not able to obtain upgrades to their copper wirelines will install additional wirelines in order to use voice and data communications simultaneously.

Employment of telecommunications equipment installers and repairers is expected to decrease because newer, more reliable technologies will reduce the need for equipment maintenance. Employment of these workers also will be limited by the tendency of many companies to contract out maintenance and construction work to specialized contractors that are part of the construction industry. However, there still will be many openings available for individuals with the necessary technical skills.

Employment of electrical and electronics engineers and computer professionals is expected to grow faster than that of the overall telecommunications industry. The expansion of communications networks, and the need for telecommunications providers to invest in research and development, will create job opportunities for electrical and electronics engineers. The use of increasingly sophisticated computer technology will increase employment of computer professionals, including computer software engineers, computer support specialists, and computer systems analysts. Growth among these occupations will, in turn, create employment opportunities for engineering and computer and information systems managers.

Sources of Additional Information

For information about employment opportunities, contact your local telecommunications company, or:

- International Brotherhood of Electrical Workers, Telecommunications Department, 1125 15th St. NW., Washington, DC 20005.
- Communications Workers of America, 501 3rd St. NW., Washington, DC 20001.

For information about certifications and courses on satellite dish installation, contact:

- Satellite Broadcasting and Communications Association (SBCA), 225 Reinekers Lane, Suite 600, Alexandria, VA 22314.

For information about certifications and courses on cable and telecommunications technology, contact:

- Society of Cable and Telecommunications Engineers (SCTE), 140 Phillips Rd., Exton, PA 19341-1318.
Internet: <http://www.scte.org>

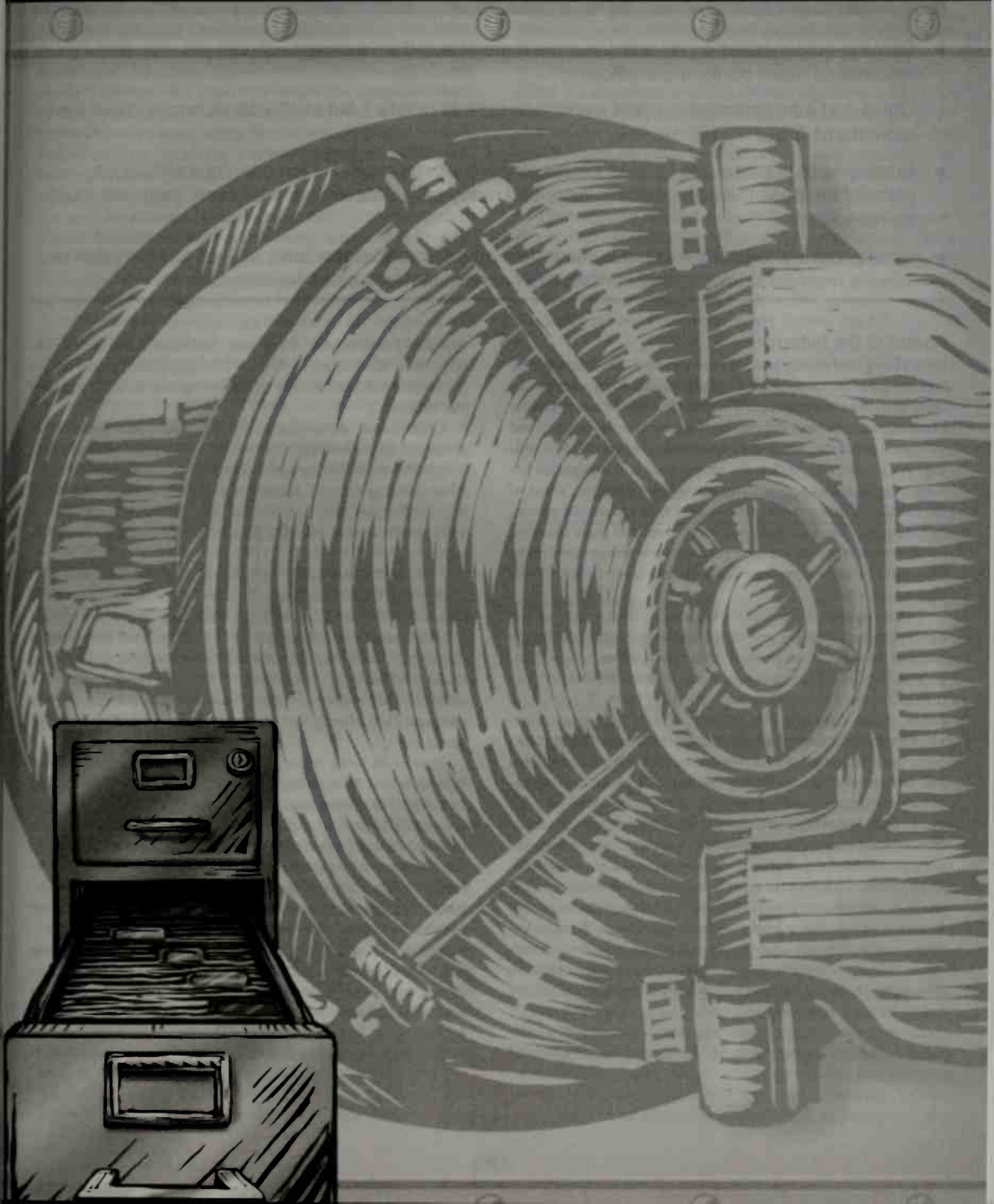
For general information on the cable and telecommunications industries, contact:

- National Cable and Telecommunications Association (NCTA), 1724 Massachusetts Ave. NW., Washington, DC 20036.

More information about the following occupations in the telecommunications industry appears in the 2004-05 edition of the *Occupational Outlook Handbook*.

- Communications equipment operators
- Customer service representatives
- Electrical and electronics engineers, except computer
- Line installers and repairers
- Office clerks, general
- Radio and telecommunications equipment installers and repairers

Financial Activities



SIGNIFICANT POINTS

- Banking employment is projected to grow more slowly than average as consolidation and automation make banks more efficient.
- Office and administrative support workers constitute nearly 7 out of 10 jobs; tellers account for more than 1 out of 4 jobs.
- Employment of tellers will increase more slowly than average, but job openings should be plentiful because the occupation is large and many tellers leave their jobs every year and must be replaced.
- Employment growth is expected in management and professional jobs, as well as for customer service representatives and securities and financial services sales representatives.

Nature of the Industry

Banks safeguard money and valuables and provide loans, credit, and payment services, such as checking accounts, money orders, and cashier's checks. With the passage of the Financial Modernization Act in 1999, banks also may offer investment and insurance products, which they were once prohibited from selling. As a variety of models for cooperation and integration between the financial services industries have emerged, some of the traditional distinctions between banks, insurance companies, and securities firms have diminished. In spite of these changes, banks continue to maintain and perform their primary role in the financial system—accepting deposits and lending funds from these deposits.

There are several types of banks, which differ in the number of services they provide and the clientele they serve. Although some of the differences between these types of banks have lessened as they begin to expand the range of products and services they offer, there are still key distinguishing traits. *Commercial banks*, which dominate this industry, offer a full range of services for individuals, businesses, and governments. These banks come in a wide range of sizes, from large global banks to regional and community banks. Global banks are involved in international lending and foreign currency trading, in addition to the more typical banking services. Regional banks have numerous branches and automated teller machine (ATM) locations throughout a multi-state area that provide banking services to individuals. Community banks are based locally and offer more personal attention, which many individuals and small businesses prefer. In recent years, online banks—which provide all services entirely over the Internet—have entered the market, with some success. However, many traditional banks have also expanded to offer online banking, and some formerly Internet-only banks are opting to open branches.

Savings banks and *savings and loan associations*, sometimes called thrift institutions, are the second largest group of

depository institutions. They were first established as community-based institutions to finance mortgages for people to buy homes and still cater mostly to the savings and lending needs of individuals.

Credit unions are another kind of depository institution. Most credit unions are formed by people with a common bond, such as those who work for the same company or belong to the same labor union or church. Members pool their savings and, when they need money, they may borrow from the credit union, often at a lower interest rate than that demanded by other financial institutions.

Federal Reserve banks are Government agencies that perform many financial services for the Government. Their chief responsibilities are to regulate the banking industry and to control the Nation's money supply—the total quantity of money in the country, including cash and bank deposits. Federal Reserve banks also perform a variety of services for other banks. For example, they make emergency loans to banks that are short of cash and clear checks that are drawn and paid out by different banks.

Interest on loans is the principal source of revenue for most banks, making their various lending departments critical to their success. The commercial lending department loans money to companies to start or expand a business or to purchase inventory and capital equipment. The consumer lending department handles student loans, credit cards, and loans for home improvements, debt consolidation, and automobile purchases. Finally, the mortgage lending department loans money to individuals and businesses to purchase real estate.

The money to lend comes primarily from deposits in checking and savings accounts, certificates of deposit, money market accounts, and other deposit accounts that consumers and businesses set up with the bank. These deposits often earn interest for the owner, and accounts that offer checking provide an easy method for making payments safely without using cash. Depos-

its in many banks are insured by the Federal Deposit Insurance Corporation, which ensures that depositors will get their money back, up to a stated limit, if a bank should fail.

Technology is having a major impact on the banking industry. For example, many routine bank services that once required a teller, such as making a withdrawal or deposit, are now available through ATMs that allow people to access their accounts 24 hours a day. Also, direct deposit allows companies and governments to electronically transfer payments into various accounts. Further, debit cards, which oftentimes double as ATM cards, instantaneously deduct money from an account when the card is swiped across a machine at a store's cash register. Electronic banking by phone or computer allows customers to pay bills and transfer money from one account to another. Through these channels, bank customers can also access information such as account balances and statement history. Some banks have begun offering online account aggregation, which makes available in one place detailed and up-to-date information on a customer's accounts held at various different institutions.

Advancements in technology have also led to improvements in the ways in which banks process information. Use of check imaging, which allows banks to store photographed checks on the computer, is one such example that has recently been implemented by some banks. Other types of technology have greatly impacted the lending side of banking. For example, the availability and growing use of credit scoring software allows loans to be approved in minutes—rather than days—making lending departments more efficient.

Other fundamental changes are occurring in the industry as banks diversify their services to become more competitive. Many banks now offer their customers financial planning and asset management services, as well as brokerage and insurance services, often through a subsidiary or third party. Others are beginning to provide investment banking services that help companies and governments raise money through the issuance of stocks and bonds, also usually through a subsidiary. As banks respond to deregulation and as competition in this sector grows, the nature of the banking industry will continue to undergo significant change.

Working Conditions

The average workweek for nonsupervisory workers in banking was 35.9 hours in 2002. Supervisory and managerial employees, however, usually work substantially longer hours. Twelve percent of employees in 2002, mostly tellers, worked part-time.

Working conditions also vary according to where the employee works. Employees in a typical branch work weekdays, some evenings if the bank is open late, and Saturday mornings. Hours may be longer for workers in bank branches located in grocery stores and shopping malls, which are open most evenings and weekends. Branch office jobs, particularly teller positions, require continual communication with customers, repetitive tasks, and a high level of attention to security. Tellers also must stand for long periods in a confined space.

To improve customer service and provide greater access to bank personnel, banks are establishing centralized phone centers, staffed mainly by customer service representatives. Employees of phone centers spend most of their time answering

phone calls from customers and must be available to work evening and weekend shifts.

Administrative support employees may work in large processing facilities, in the banks' headquarters, or in other administrative offices. Most support staff work a standard 40-hour week; some may work overtime. Those support staff located in the processing facilities may work evening shifts.

Commercial and mortgage loan officers often work out of the office, visiting clients, checking out loan applications, and soliciting new business. Loan officers may be required to travel if a client is out of town, or to work evenings if that is the only time at which a client can meet. Financial service sales representatives also may visit clients in the evenings and on weekends to go over the client's financial needs.

The remaining employees located primarily at the headquarters or other administrative offices usually work in comfortable surroundings and put in a standard workweek. In general, banks are relatively safe places to work. In 2002, cases of work-related injury and illness averaged 1.5 per 100 full-time workers, among the lowest in the private sector, where the rate was 5.3.

Employment

The banking industry employed about 1.8 million wage and salary workers in 2002. More than 7 out of 10 jobs were in commercial banks; the remainder were concentrated in savings institutions and credit unions (table 1).

Table 1. Percent distribution of employment in banking by type of institution, 2002

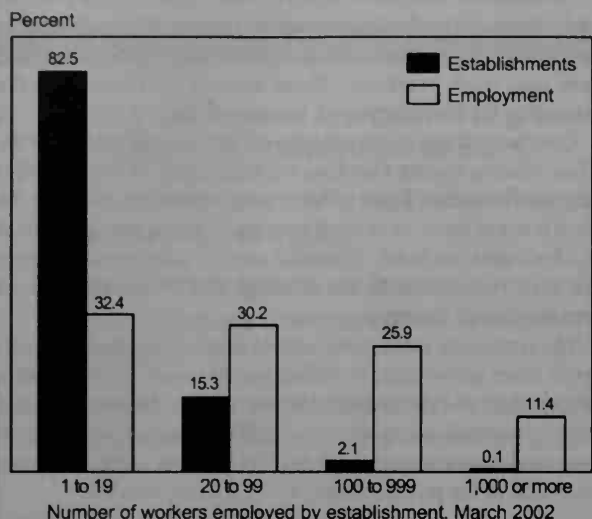
	Establishments	Employment
Banking, total	100.0	100.0
Monetary authorities—Central Bank	0.2	1.3
Depository credit intermediation	99.8	98.7
Commercial banking	67.9	72.5
Savings institutions	15.9	13.8
Credit unions	14.6	11.2
Other depository credit intermediation	1.4	1.2

In 2002, over 82 percent of establishments in banking employed fewer than 20 workers (chart). However, these small establishments, mostly bank branch offices, employed 32 percent of all employees. More than two-thirds of the jobs were in establishments with 20 or more workers. Banks are found everywhere in the United States, but most bank employees work in heavily populated States such as New York, California, Illinois, Pennsylvania, and Texas.

Occupations in the Industry

Office and administrative support occupations account for nearly 7 out of 10 jobs in the banking industry (table 2). *Bank tellers*, the largest number of workers in banking, provide routine financial services to the public. They handle customers' deposits and withdrawals, change money, sell money orders and traveler's checks, and accept payment for loans and utility bills. Increasingly, tellers also are selling bank services to customers. *New*

More than 8 out of 10 establishments in banking employ fewer than 20 workers



accounts clerks and *customer service representatives* answer questions from customers, and help them open and close accounts and fill out forms to apply for banking services. They are knowledgeable about a broad array of bank services and must be able to sell those services to potential clients. Some customer service representatives work in a call or customer contact center environment, taking phone calls and answering emails from customers. In addition to responding to inquiries, these workers also help customers over the phone with routine banking transactions and handle and resolve problems or complaints.

Loan and credit clerks assemble and prepare paperwork, process applications, and complete the documentation after a loan or line of credit has been approved. They also verify applications for completeness. *Bill and account collectors* attempt to collect payments on overdue loans. Many *general office clerks* and *bookkeeping, accounting, and auditing clerks* are employed to maintain financial records, enter data, and process the thousands of deposit slips, checks, and other documents that banks handle daily. Banks also employ many *secretaries, data entry and information processing workers, receptionists*, and other office and administrative support workers. *Office and administrative support worker supervisors and managers* oversee the activities and training of workers in the various administrative support occupations.

Management, business, and financial occupations account for about 25 percent of employment in the banking industry. *Financial managers* direct bank branches and departments, resolve customers' problems, ensure that standards of service are maintained, and administer the institutions' operations and investments. *Loan officers* evaluate loan applications, determine an applicant's ability to pay back a loan, and recommend approval of loans. They usually specialize in commercial, consumer, or mortgage lending. When loans become delinquent, loan officers, or *loan counselors*, may advise borrowers on the management of their finances or take action to collect outstand-

ing amounts. Loan officers also play a major role in bringing in new business and spend much of their time developing relationships with potential customers. *Trust officers* manage a variety of assets that were placed in trust with the bank for other people or organizations; these assets can include pension funds, school endowments, or a company's profit-sharing plan. Sometimes, trust officers act as executors of estates upon a person's death. They also may work as accountants, lawyers, and investment managers.

Securities, commodities, and financial services sales agents, who make up the majority of sales positions in banks, sell complex banking services. They contact potential customers to explain their services and to ascertain the customer's banking and other financial needs. They also may discuss services such as deposit accounts, lines of credit, sales or inventory financing, certificates of deposit, cash management, or investment services. These sales agents also solicit businesses to participate in consumer credit card programs. At most small and medium-size banks, however, branch managers and commercial loan officers are responsible for marketing the bank's financial services.

Other occupations used widely by banks to maintain financial records and ensure the bank's compliance with Federal and State regulations are *accountants and auditors*, and *lawyers*. In addition, *computer specialists* are needed to maintain and upgrade the bank's computer systems and to implement the bank's entry into the world of electronic banking and paperless transactions.

Training and Advancement

Bank tellers and other clerks usually need only a high school education. Most banks seek people who have good basic math and communication skills, enjoy public contact, and feel comfortable handling large amounts of money. Through a combination of formal classroom instruction and on-the-job training under the guidance of an experienced worker, tellers learn the procedures, rules, and regulations that govern their jobs. Banks encourage upward mobility by providing access to higher education and other sources of additional training.

Some banks have their own training programs which result in teller certification. Experienced tellers qualify for certification by taking required courses and passing examinations. Experienced tellers and clerks may advance to head teller, new accounts clerk, or customer service representative. Outstanding tellers who have had some college or specialized training are sometimes promoted to managerial positions.

Workers in management, business, and financial occupations usually have at least a college degree. A bachelor's degree in business administration or a liberal arts degree with business administration courses is suitable preparation, as is a bachelor's degree in any field followed by a Master of Business Administration (MBA) degree. Many financial management positions are filled by promoting experienced, technically skilled professional personnel—for example, accountants, auditors, budget analysts, credit analysts, or financial analysts—or accounting or related department supervisors in large banks.

Financial services sales agents usually need a college degree; a major or courses in finance, accounting, economics, marketing, or related fields serve as excellent preparation. Experience in

Table 2. Employment of wage and salary workers in banking by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,761	100.0	6.4
Management, business, and financial occupations	445	25.3	11.6
Chief executives	17	1.0	9.5
General and operations managers	43	2.5	6.
Marketing and sales managers	13	0.7	14.0
Computer and information systems managers	9	0.5	17.6
Financial managers	81	4.6	9.4
Human resources, training, and labor relations specialists	12	0.7	12.5
Management analysts	11	0.6	9.5
Accountants and auditors	22	1.2	8.9
Credit analysts	13	0.8	9.4
Financial analysts	17	1.0	30.2
Personal financial advisors	15	0.9	29.7
Loan counselors	6	0.4	7.6
Loan officers	97	5.5	10.8
Professional and related occupations	69	3.9	14.1
Computer programmers	9	0.5	-5.3
Computer software engineers	9	0.5	20.0
Computer support specialists	10	0.5	9.5
Computer systems analysts	11	0.7	20.1
Sales and related occupations	65	3.7	15.5
Securities, commodities, and financial services sales agents	41	2.3	20.4
Office and administrative support occupations	1,162	66.0	3.4
First-line supervisors/managers of office and administrative support workers	99	5.6	-2.1
Bill and account collectors	21	1.2	13.5
Bookkeeping, accounting, and auditing clerks	55	3.1	-1.6
Tellers	467	26.5	9.2
Credit authorizers, checkers, and clerks	14	0.8	-13.9
Customer service representatives	112	6.3	20.3
Loan interviewers and clerks	72	4.1	-19.3
New accounts clerks	86	4.9	9.4
Executive secretaries and administrative assistants	42	2.4	-2.1
Secretaries, except legal, medical, and executive	17	1.0	-15.5
Office clerks, general	53	3.0	-4.7

NOTE: May not add to totals due to omission of occupations with small employment.

sales also is very helpful. These workers learn on the job under the supervision of bank officers. Sales agents selling securities need to be licensed by the National Association of Securities Dealers, and agents selling insurance also must obtain licensure.

Advancement to higher level executive, administrative, managerial, and professional positions may be accelerated by taking additional training. Banks often provide opportunities and en-

courage employees to take classes offered by banking and financial management affiliated organizations or other educational institutions. Classes often deal with a different phase of financial management and banking, such as accounting management, budget management, corporate cash management, financial analysis, international banking, and data processing systems procedures and management. Employers also sponsor seminars and conferences, and provide textbooks and other educational materials. Many employers pay all or part of the costs for those who successfully complete courses.

In recent years, the banking field has been revolutionized by technological improvements in computer and data processing equipment. Learning how to apply these improvements is a vital upgrade to managerial skills that enhances advancement opportunities.

Earnings

Earnings of nonsupervisory bank employees averaged \$458 a week in 2002, compared with \$632 for all workers in finance and insurance industries, and \$506 for workers throughout the private sector. Relatively low pay in the banking industry reflects the high proportion of low-paying administrative support jobs.

Earnings in the banking industry vary significantly by occupation. Earnings in the largest occupations in banking appear in table 3.

Table 3. Median hourly earnings of the largest occupations in banking, 2002

Occupation	Banking	All industries
General and operations managers	\$32.75	\$32.80
Financial managers	28.26	35.26
Loan officers	19.93	21.15
Securities, commodities, and financial services sales agents	19.17	29.32
First-line supervisors/managers of office and administrative support workers	17.07	18.66
Executive secretaries and administrative assistants	15.71	16.06
Loan interviewers and clerks	12.71	13.38
New accounts clerks	12.04	12.11
Customer service representatives	11.95	12.62
Office clerks, general	11.07	10.71
Tellers	9.81	9.81

In general, greater responsibilities result in a higher salary. Experience, length of service, and, especially, the location and size of the bank also are important. In addition to typical benefits, equity sharing and performance-based pay increasingly are part of compensation packages for some bank employees. As banks encourage employees to become more sales-oriented, incentives are increasingly tied to meeting sales goals, and some workers may even receive commissions for sales or referrals. As in other industries, part-time workers do not enjoy the same benefits that full-time workers do.

Very few workers in the banking industry are unionized—only 2 percent are union members or are covered by union contracts, compared with 15 percent of workers throughout private industry.

Outlook

Wage and salary employment in banking is projected to increase 6 percent between 2002 and 2012, compared with the 16 percent growth projected for the economy as a whole. The combined effects of technology, deregulation, mergers, and population growth will continue to affect total employment growth and the mix of occupations in the banking industry. Overall declines in office and administrative support occupations will be offset by growth in professional, managerial, and sales occupations. Although minimal growth in employment is expected, job opportunities should be favorable, particularly for teller and other administrative support jobs because they make up a large proportion of bank employees and workers in these jobs often transfer to other occupations or leave the labor force.

The consolidation which resulted from bank mergers contributed significantly to employment declines throughout much of the past decade. Merger activity—at a slower pace—is expected to continue over the projection period, dampening employment growth. At the same time, banks have begun to refocus on the branch as a critical means of servicing customers and many banks will open more branch offices in areas in which the population is growing. However, because of widespread automation of many banking services, fewer employees will be hired to staff new branches than in the past.

Advances in technology should continue to have the most significant effect on employment in the banking industry. Demand for computer specialists will grow as more banks make their services available electronically and eliminate much of the paperwork involved in many banking transactions. On the other hand, these changes in technology will reduce the need for several office and administrative support occupations. Employment of tellers will grow more slowly than average as customers increasingly use ATMs, direct deposit, debit cards, and telephone and internet banking to perform routine transactions. Other technological improvements, such as digital imaging and computer networking, are likely to lead to a decrease or change in the nature of employment of the “back-office” clerical workers who process checks and other bank statements. Employment of customer service representatives, however, is expected to increase as banks hire more of these workers to staff phone centers and respond to e-mails.

Deregulation of the banking industry allows banks to offer a variety of financial and insurance products that they were once prohibited from selling. The need to develop, analyze, and sell

these new services will spur demand for securities and financial services sales representatives, financial analysts, and personal financial advisors. Demand for “personal bankers” to advise and manage the assets of wealthy clients, as well as the aging baby-boom generation, also will grow. However, banks will face continued competition—particularly in lending—from nonbank establishments, such as consumer credit companies and mortgage brokers. Companies and individuals now are able to obtain loans and credit and raise money through a variety of means other than bank loans. Therefore, employment of loan officers will grow only about as fast as the average over the next decade, as some are replaced by financial services sales representatives, who sell loans along with other bank services.

Sources of Additional Information

State bankers’ associations can furnish specific information about job opportunities in their State. Individual banks can provide detailed information about job openings and the activities, responsibilities, and preferred qualifications of banking personnel.

Information about careers with the Federal Reserve System is available from the Web site or human resources department of the various regional Federal Reserve Banks.

Information on many of the occupations in banking, including the following, may be found in the 2004-05 edition of the *Occupational Outlook Handbook*:

- Accountants and auditors
- Bill and account collectors
- Bookkeeping, accounting, and auditing clerks
- Computer support specialists and systems administrators
- Credit authorizers, checkers, and clerks
- Customer service representatives
- Financial managers
- Information and record clerks
- Loan counselors and officers
- Securities, commodities, and financial services sales agents
- Systems analysts, computer scientists, and database administrators
- Tellers

SIGNIFICANT POINTS

- While corporate downsizing, computerization, and changes in business practices will limit job growth in this large industry, numerous job openings are expected, enabling new workers to replace those who leave or retire.
- Growing areas of the insurance industry are medical services and health insurance and the industry's expansion into the broader financial services field.
- Office and administrative occupations usually require a high school diploma, whereas employers prefer college graduates for sales, managerial, and professional jobs.

Nature of the Industry

The insurance industry provides protection against financial losses resulting from a variety of perils. By purchasing insurance policies, individuals and businesses can receive reimbursement for losses due to car accidents, theft of property, and fire and storm damage; medical expenses; and loss of income due to disability or death.

The insurance industry consists mainly of *insurance carriers* (or *insurers*) and *insurance agencies and brokerages*. In general, insurance carriers are large companies that provide insurance and assume the risks covered by the policy. Insurance agencies and brokerages sell insurance policies for the carriers. While some of these establishments are directly affiliated with a particular insurer and sell only that carrier's policies, many are independent and are thus free to market the policies of a variety of insurance carriers. In addition to supporting these two primary components, the insurance industry includes establishments that provide other insurance-related services, such as claims adjustment or third-party administration of insurance and pension funds.

Insurance carriers assume the risk associated with annuities and insurance policies and assign premiums to be paid for the policies. In the policy, the carrier states the length and conditions of the agreement, exactly which losses it will provide compensation for, and how much will be awarded. The premium charged for the policy is based primarily on the amount to be awarded in case of loss, as well as the likelihood that the insurance carrier will actually have to pay. In order to be able to compensate policyholders for their losses, insurance companies invest the money they receive in premiums, building up a portfolio of financial assets and income-producing real estate which can then be used to pay off any future claims that may be brought. There are two basic types of insurance carriers: *direct and reinsurance*. Direct carriers are responsible for the initial underwriting of insurance policies and annuities, while reinsurance carriers assume all or part of the risk associated with the existing insurance policies originally underwritten by other insurance carriers.

Direct insurance carriers offer a variety of insurance policies. *Life insurance* provides financial protection to beneficiaries—

usually spouses and dependent children—upon the death of the insured. *Disability insurance* supplies a preset income to an insured person who is unable to work due to injury or illness, and *health insurance* pays the expenses resulting from accidents and illness. An *annuity* (a contract or a group of contracts that furnishes a periodic income at regular intervals for a specified period) provides a steady income during retirement for the remainder of one's life. *Property-casualty insurance* protects against loss or damage to property resulting from hazards such as fire, theft, and natural disasters. *Liability insurance* shields policyholders from financial responsibility for injuries to others or for damage to other people's property. Most policies, such as automobile and homeowner's insurance, combine both property-casualty and liability coverage. Companies that underwrite this kind of insurance are called property-casualty carriers.

Some insurance policies cover groups of people, ranging from a few to thousands of individuals. These policies usually are issued to employers for the benefit of their employees or to unions, professional associations, or other membership organizations for the benefit of their members. Among the most common policies of this nature are group life and health plans. Insurance carriers also underwrite a variety of specialized types of insurance, such as real-estate title insurance, employee surety and fidelity bonding, and medical malpractice insurance.

A relatively recent act of Congress allows insurance carriers and other financial institutions, such as banks and securities firms, to sell one another's products. As a result, more insurance carriers now sell financial products such as securities, mutual funds, and various retirement plans. This approach is most common in life insurance companies that already sell annuities; however, property and casualty companies also are increasingly selling a wider range of financial products. In order to expand into one another's markets, insurance carriers, banks, and securities firms have engaged in numerous mergers, allowing the merging companies access to each other's client base and geographical markets.

Insurance carriers have discovered that the Internet can be a powerful tool for reaching potential and existing customers. Most carriers use the Internet simply to post company information, such as sales brochures and product information, financial state-

ments, and a list of local agents. However, an increasing number of carriers are starting to expand their web sites to enable customers to access online account and billing information, and a few carriers even allow claims to be submitted online. Some carriers also provide insurance quotes online based on the information submitted by customers on their Internet sites. In the future, carriers will allow customers to purchase policies through the Internet without ever speaking to a live agent.

In addition to individual carrier-sponsored Internet sites, several "lead-generating" sites have emerged. These sites allow potential customers to input information about their insurance policy needs. For a fee, the sites forward customer information to a number of insurance companies, which review the information and, if they decide to take on the policy, contact the customer with an offer. This practice gives consumers the freedom to accept the best rate.

The insurance industry also includes a number of independent organizations that provide a wide array of insurance-related services to carriers and their clients. One such service is the processing of claims forms for medical practitioners. Other services include loss prevention and risk management. Also, insurance companies sometimes hire independent claims adjusters to investigate accidents and claims for property damage and to assign a dollar estimate to the claim.

Other organizations in the industry are formed by groups of insurance companies, to perform functions that would result in a duplication of effort if each company carried them out individually. For example, service organizations are supported by insurance companies to provide loss statistics, which the companies use to set their rates.

Working Conditions

Many workers in the insurance industry—especially those in administrative support positions—work a 5-day, 40-hour week. Those in executive and managerial occupations often put in more than 40 hours. Many insurance sales agents, claims adjusters, and investigators work irregular hours outside of office settings. Often, sales agents and adjusters arrange their own hours, scheduling evening and weekend appointments for the convenience of clients. This accommodation may result in these individuals working 50 to 60 hours per week.

Insurance sales agents often visit prospective and existing customers' homes and places of business to market new products and provide services. Claims adjusters and auto damage appraisers frequently leave the office to inspect damaged property; occasionally, claims adjusters are away from home for days, traveling to the scene of a disaster—such as a tornado, flood, or hurricane—to work with local adjusters and government officials. Insurance investigators often work irregular hours to conduct surveillance or to contact people who are not available during normal working hours.

A small, but increasing, number of insurance employees spend most of their time on the telephone working in call centers, answering questions and providing information to prospective clients or current policyholders. These jobs may include selling insurance, taking claims information, or answering medical questions. Because such centers operate 24 hours a day, 7 days a week, some of their employees must work evening and weekend

shifts. The irregular business hours in the insurance industry provide some workers with the opportunity for part-time work. Part-time employees make up 8.5 percent of the workforce. As would be expected in an industry dominated by office and sales employees, the incidence of occupational injuries and illnesses among insurance workers is low. In 2002, only 1.6 cases per 100 full-time workers were reported among insurance carriers, while just 0.9 cases per 100 full-time workers were reported among agents and brokers. These figures compare with an average of 5.3 for all private industry.

Employment

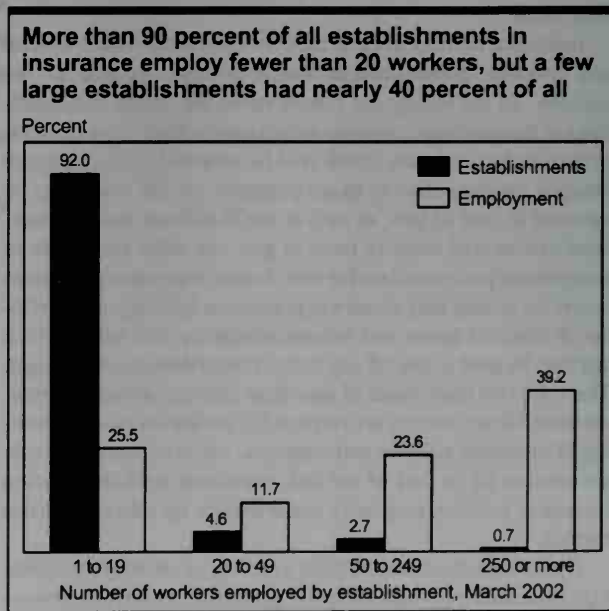
The insurance industry employed about 2.2 million wage and salary workers in 2002. Insurance carriers accounted for 3 out of 5 jobs in the insurance industry; insurance agencies, brokerages, and providers of other insurance-related services 2 out of 5 jobs. In addition, about 141,000 workers in the industry were self-employed in 2002, most of whom were insurance sales agents.

The majority of establishments in the insurance industry were small, however, a few large establishments accounted for many of the jobs in this industry. Insurance carriers tend to be large establishments, often employing 250 or more workers, whereas agencies and brokerages tend to be much smaller, frequently employing fewer than 20 workers. (See chart)

Many insurance carriers' home and regional offices are situated near large urban centers. Insurance workers who deal directly with the public—sales agents and claims adjusters—are located throughout the country. Almost all insurance sales agents work out of local company offices or independent agencies. Many claims adjusters work for independent firms in small cities and towns throughout the country.

Occupations in the Industry

About 46 percent of insurance workers are in office and administrative support jobs found in every industry, including jobs such



as secretaries, typists, word processors, bookkeepers, and other clerical workers. (See table 1.) Many office and administrative support positions in the insurance industry, however, require skills and knowledge unique to the industry.

Customer service representatives, for example, process insurance policy applications, changes, and cancellations. They review applications for completeness, compile data on policy changes, and verify the accuracy of insurance company records. They may also process claims and sell new policies to existing clients. Nowadays, these workers are taking on increased responsibilities in insurance offices, such as handling most of the continuing contact with clients. A growing number of customer service representatives work in call centers that are open 24 hours a day, 7 days a week, where they answer clients' questions, update policy information, and provide potential clients with information regarding the types of policies the company issues.

More than 28 percent of insurance workers are in management or business and financial operations occupations. *Marketing and sales managers* constitute the majority of managers in carriers' local sales offices and in the insurance sales agents segment. These employees sell insurance products, work with clients, and supervise staff. Other managers who work in their companies' home offices are in charge of functions such as actuarial calculations, policy issuance, accounting, and investments.

Claims adjusters, examiners, and investigators decide whether claims are covered by the customer's policy, confirm payment, and, when necessary, investigate the circumstances surrounding a claim. Claims adjusters work for property and liability insurance carriers or for independent adjusting firms. They inspect property damage, estimate how much it will cost to repair, and determine the extent of the insurance company's liability; in some cases, they may help the claimant receive assistance quickly in order to prevent further damage and begin repairs. Adjusters plan and schedule the work required to process claims, which may include interviewing the claimant and witnesses and consulting police and hospital records. In some property-casualty companies, claims adjusters are called claims examiners, but in other companies, a claims examiner's primary job is to review claims to ensure that proper guidelines have been followed. Only occasionally—especially when disasters suddenly increase the volume of claims—do these examiners aid adjusters with complicated claims.

In the offices of life and health insurance carriers, claims examiners are the counterparts of the claims adjuster who works in a property and casualty insurance firm. Examiners in the health insurance field review health-related claims to see whether the costs are reasonable based on the diagnosis. Examiners check claim applications for completeness and accuracy, interview medical specialists, and consult policy files to verify information on a claim. Claims examiners in the life insurance field review causes of death and also may review new applications for life insurance to make sure that the applicants have no serious illnesses that would prevent them from qualifying for insurance.

Insurance investigators handle claims in which companies suspect fraudulent or criminal activity, such as suspicious fires, questionable workers' disability claims, difficult-to-explain accidents, and dubious medical treatment. Investigators usually perform database searches on suspects to determine whether

they have a history of attempted or successful insurance fraud. Then, the investigators may visit claimants and witnesses to obtain a recorded statement, take photographs, inspect facilities, and conduct surveillance on suspects. Investigators often consult with legal counsel and are sometimes called to testify as expert witnesses in court cases.

Auto damage appraisers usually are hired by insurance companies and independent adjusting firms to inspect the damage to a motor vehicle after an accident and to provide unbiased estimates of repair cost. Claims adjusters and auto damage appraisers can work for insurance companies, or they can be independent or public adjusters. Insurance companies hire independent adjusters to represent their interests while assisting the insured, whereas public adjusters are hired to represent the insured's interests against insurance carriers.

Loss control representatives assess various risks faced by insurance companies. These workers inspect the business operations of insurance applicants, analyze historical data regarding workplace injuries and automobile accidents, and assess the potential for natural hazards, dangerous business practices, and unsafe workplace conditions that may result in injuries or catastrophic physical and financial loss. They might then recommend, for example, that a factory add safety equipment, that a house be reinforced to withstand environmental catastrophes, or that incentives be implemented to encourage automobile owners to install air bags in their cars or take more effective measures to prevent theft. Because the changes they recommend can greatly reduce the probability of loss, loss control representatives are increasingly important to both insurance companies and the insured.

Underwriting is another important management and business and financial occupation in insurance. *Underwriters* evaluate insurance applications to determine the risk involved in issuing a policy. They decide whether to accept or reject an application, and they determine the appropriate premium for each policy.

About 15 percent of wage and salary employees in the industry are sales workers, selling policies to individuals and businesses. *Insurance sales agents*, also referred to as *producers*, may work as exclusive agents, or captive agents, selling for one company, or as independent agents selling for several companies. Through regular contact with clients, agents are able to update coverage, assist with claims, ensure customer satisfaction, and obtain referrals. Insurance sales agents may sell many types of insurance, including life, annuities, property-casualty, health, and disability insurance. Many insurance sales agents are involved in "cross-selling" or "total account development," which means that, besides offering insurance, they have become licensed to sell mutual funds, annuities, and other securities. These agents usually find their own customers and ensure that the policies sold meet the specific needs of their policyholders.

The insurance industry employs relatively few people in professional or related occupations, but those who are so employed are essential to company operations. For example, insurance companies' lawyers defend clients who are sued, especially when large claims may be involved. These lawyers also review regulations and policy contracts. Nurses and other medical professionals advise clients on wellness issues and on medical procedures covered by the company's managed-care plan. *Computer*

Table 1. Employment of wage and salary workers in insurance by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	2,223	100.0	7.5
Management, business, and financial occupations	628	28.2	13.1
Chief executives	17	0.8	15.9
General and operations managers	43	2.0	12.0
Marketing managers	10	0.5	13.8
Sales managers	15	0.7	24.2
Administrative services managers	12	0.6	10.1
Computer and information systems managers	15	0.7	20.0
Financial managers	20	0.9	13.2
All other managers	28	1.2	11.5
Claims adjusters, examiners, and investigators	183	8.3	12.7
Human resources, training, and labor relations specialists	24	1.1	16.8
Management analysts	21	1.0	11.1
All other business operations specialists	37	1.7	17.8
Accountants and auditors	34	1.5	12.1
Insurance underwriters	87	3.9	8.7
Professional and related occupations	233	10.5	11.4
Computer programmers	25	1.1	-5.9
Computer software engineers	13	0.6	17.7
Computer support specialists	19	0.9	12.0
Computer systems analysts	39	1.8	17.9
Actuaries	9	0.4	11.0
Lawyers	12	0.6	23.2
Title examiners, abstractors, and searchers	18	0.8	-12.0
Registered nurses	16	0.7	12.0
Sales and related occupations	328	14.7	12.3
First-line supervisors managers of non-retail sales workers	21	0.9	16.5
Insurance sales agents	265	11.9	12.9
Telemarketers	11	0.5	-13.9
Office and administrative support occupations	1,012	45.5	1.7
First-line supervisors managers of office and administrative support workers	72	3.2	-1.3
Billing and posting clerks and machine operators	13	0.6	-0.9
Bookkeeping, accounting, and auditing clerks	44	2.0	2.5
Customer service representatives	238	10.7	15.1
File clerks	18	0.8	-12.7
Executive secretaries and administrative assistants	57	2.6	0.5
Secretaries, except legal, medical, and executive	70	3.1	-9.6
Other office and administrative support workers	415	18.7	-3.1
Data entry keyers	23	1.0	-17.3
Word processors and typists	10	0.5	-45.5
Insurance claims and policy processing clerks	222	10.0	1.9
Office clerks, general	99	4.5	0.4
All other secretaries, administrative assistants, and other office support workers	27	1.2	-14.4

NOTE: May not add to totals due to omission of occupations with small employment.

systems analysts, computer programmers, and computer support specialists are needed to analyze, design, develop, and program the systems that support the day-to-day operations of the insurance company.

Actuaries represent a relatively small proportion of employment in the insurance industry, but they are vital to the industry's profitability. Actuaries study the probability of an insured loss and determine premium rates. They must set the rates so that there is a high probability that premiums paid by customers will cover claims, but not so high that their company loses business to competitors.

Training and Advancement

A few jobs in the insurance industry, especially in office and administrative support occupations, require no more than a high school diploma. However, employers prefer to hire workers with a college education for most jobs, including sales, managerial, and professional jobs. When specialized training is required, it usually is obtained on the job or through independent study during work or after work hours.

Graduation from high school or a 2-year postsecondary business program is adequate preparation for most beginning office and administrative support jobs. Courses in word processing and business math are assets, and the ability to operate computers is essential. These and other special skills also help beginners advance to higher paying positions. On-the-job training usually is provided for clerical jobs such as customer service representatives. Because representatives in call centers must be knowledgeable about insurance products in order to provide advice to clients, more States are requiring customer service representatives to become licensed.

Management, business, financial, and professional jobs require the same college training as similar jobs in other industries. Managerial positions usually are filled by promoting college-educated employees from within the company. For beginning underwriting jobs, many insurance companies prefer college graduates who have a degree in business administration or a related field. However, some companies prefer to hire liberal arts graduates at a lower cost, and many insurers send them to company schools or enroll them in outside institutes for professional training. As an underwriter's career develops, it becomes beneficial to earn one of the voluntary professional certifications in underwriting. (Additional information on these designations is available in the *Occupational Outlook Handbook* statement on insurance underwriters).

Most companies prefer to hire college graduates for claims adjuster and examiner positions. No specific college major is required, although most workers in these positions have a business, accounting, engineering, legal, or medical background. Licensing requirements for these workers vary by State and can include prelicensing education or passing a licensing exam. In some cases, professional designations may be substituted for the exam requirement. Separate or additional requirements may apply to public adjusters. For example, some States may require public adjusters to file a surety bond. Often, claims adjusters working for companies can work under the company license and do not need to become licensed themselves. In addition, many adjusters and examiners choose to pursue certain certifications

and designations to distinguish themselves. Many State licenses and professional designations require continuing education for renewal. Continuing education is important because adjusters and examiners must be knowledgeable about changes in the laws, recent court decisions, and new medical procedures. (Additional information is available in the *Occupational Outlook Handbook* statement on claims adjusters, appraisers, examiners, and investigators). Auto damage appraisers typically begin as auto body repairers and then are hired by insurance companies or independent adjusting firms. Most companies prefer auto damage appraisers to have formal training, and many vocational colleges offer 2-year programs on how to estimate and repair damaged vehicles. Some States require them to be licensed, and certification may be required or preferred. Computer skills also are an important qualification for many auto damage appraiser positions. As with adjusters and examiners, continuing education is important for appraisers because many new car models and repair techniques are introduced each year.

Most insurance companies prefer to hire former law enforcement or private investigators as insurance investigators. Many experienced claims adjusters or examiners also can become investigators. Licensing requirements vary among States. Most employers look for individuals with ingenuity and who are persistent and assertive. Investigators must not be afraid of confrontation, should communicate well, and should be able to think on their feet. Good interviewing and interrogation skills also are important and usually are developed in earlier careers in law enforcement.

For actuarial jobs, companies prefer candidates to have degrees in actuarial science, mathematics, or statistics. However, candidates with degrees in business, finance, or economics are becoming more common. Actuaries must pass a series of national examinations to become fully qualified. Completion of all the exams takes from 5 to 10 years. Some of the exams may be taken while an individual is in college, but most require extensive home study. Many companies grant study time to their actuarial students to prepare for the exams.

Although some employers hire high school graduates with potential or proven sales ability for entry-level sales positions, most prefer to hire college graduates. All insurance sales agents must obtain licenses in the States in which they plan to sell insurance. In most States, licenses are issued only to applicants who complete specified courses and pass written examinations covering insurance fundamentals and State insurance laws. New agents receive training from their employer, either at work or at the insurance company's home office. Sometimes, entry-level employees attend company-sponsored classes to prepare for examinations. Others study on their own and, as on-the-job training, accompany experienced agents when they meet with prospective clients. After obtaining a license, agents must earn continuing education credits throughout their careers in order to remain licensed insurance sales agents.

Insurance sales agents wishing to sell securities and other financial products must meet State licensing requirements in these areas. Specifically, they must pass an additional examination—either the Series 6 or Series 7 licensing exam, both of which are administered by the National Association of Securities Dealers (NASD). The Series 6 exam is for individuals who wish to sell

only mutual funds and variable annuities; the Series 7 exam is the main NASD series license and qualifies agents as general securities representatives. To demonstrate further competency in the area of financial planning, many agents also find it worthwhile to obtain a certified financial planner (CFP) or chartered financial consultant (ChFC) designation.

Opportunities for advancement are relatively good in the insurance industry. Office and administrative support workers can advance to higher paying claims-adjusting positions and entry-level underwriting jobs. Sales workers may advance by handling greater numbers of accounts and more complex commercial insurance policies. A master's degree, particularly in business administration or a related field, is an asset for advancement into higher levels of management. Many insurance companies expect their employees to take continuing education courses to improve their professionalism and their knowledge of the industry.

Earnings

Weekly earnings of nonsupervisory workers in the insurance industry averaged \$701 in 2002, considerably higher than the average of \$506 for all private industry. Earnings of the largest occupations in insurance in 2002 appear in table 2.

Table 2. Median hourly earnings of the largest occupations in insurance, 2002

Occupation	Insurance carriers and related activities	All industries
General and operations managers	\$43.24	\$32.80
First-line supervisors/managers of office and administrative support workers	22.59	18.66
Insurance underwriters	22.02	21.92
Claims adjusters, examiners, and investigators	20.79	20.68
Insurance sales agents	19.73	19.59
Executive secretaries and administrative assistants	16.72	16.06
Insurance claims and policy processing clerks	13.96	13.88
Bookkeeping, accounting, and auditing clerks	13.90	13.16
Customer service representatives	13.67	12.62
Secretaries, except legal, medical, and executive	12.21	12.16
Office clerks, general	10.83	10.71

Most independent sales agents own their own businesses and are paid a commission only. Sales agents who are employees of an agency may be paid a salary only, a salary plus commission, or a salary plus a bonus. An agent's earnings usually increase rapidly with experience. Many agencies also pay an agent's expenses for automobiles and transportation, travel to conventions, and continuing education.

Insurance carriers offer attractive benefits packages, as is frequently the case with large companies. Yearly bonuses, retirement investment plans, insurance, and paid vacation often are standard. Insurance agencies, which generally are smaller, offer less extensive benefits.

Unionization is not widespread in the insurance industry. In 2002, 3 percent of all insurance workers were union members or

were covered by union contracts, compared with 15 percent of workers throughout private industry.

Outlook

Wage and salary employment in the insurance industry is projected to increase 8 percent between 2002 and 2012, more slowly than the 16 percent average for all industries combined. While demand for insurance is expected to rise, downsizing, productivity increases due to new technology, and a trend toward direct mail, telephone, and Internet sales will limit job growth. However, some job growth will result from the industry's expansion into the broader financial services field, and employment in the medical service and health insurance areas is anticipated to grow. Also, thousands of openings are expected to arise in this large industry to replace workers who leave the industry, retire, or stop working for other reasons.

Medical service and health insurance is the fastest-growing sector of the insurance industry. In recent years, increasing health insurance premiums and relatively high unemployment have left some unable to afford health insurance, but over the long term, significant growth is expected. As the share of the elderly population rises, more people are expected to buy health insurance and long-term-care insurance, as well as annuities and other types of pension products sold by insurance sales agents. If legislation is passed to make health insurance affordable to more people, demand should increase further for this type of insurance. Population growth will stimulate demand for auto insurance and homeowners insurance. Population growth also will create demand for businesses to service the needs of more people, and these businesses will need insurance as well. Moreover, large liability awards are motivating growing numbers of individuals and businesses to purchase liability policies to protect against lawsuits brought by people claiming injury or damage from a product.

Many successful insurance companies will recognize the Internet's potential as a powerful marketing tool. Not only might this reduce costs for insurance companies, but it also could enable many clients to turn to the Internet first to get information on their policies, obtain quotes, or submit claims. As insurance companies begin to offer more information and services on the Internet, some occupations, such as insurance sales agent, could experience slower employment growth.

Sales agents working in the property and casualty market, particularly in auto insurance, will be most affected by increasing reliance on the Internet. Auto policies are relatively straightforward and can be issued more easily without the involvement of a live agent. Also, auto premiums tend to cost more per year than do other types of policies, so people are more likely to shop around for the best price. The Internet makes it easier to compare rates among companies.

Insurance companies will continue to face increased competition from banks and securities firms entering the insurance markets. As more of these firms begin to sell insurance policies, increasing numbers of insurance sales agents will be employed in them, rather than in insurance companies. In order to stay competitive, insurance companies have begun to expand their financial service offerings or to establish partnerships with banks or brokerage firms.

Productivity gains caused by the greater use of computer software will continue to limit the growth of certain jobs within the insurance industry. For example, the use of underwriting software that automatically analyzes and rates insurance applications will limit the employment growth of underwriters. Also, computers linked directly to the databases of insurance carriers and other organizations have made communications easier among sales agents, adjusters, and insurance carriers, so that all have become much more productive. Furthermore, efforts to contain costs have led to an increasing reliance on customer service representatives to deal with the day-to-day processing of policies and claims. In addition, the Internet has made insurance investigators more productive by drastically reducing the amount of time it takes to perform background checks, allowing investigators to handle an increasing number of cases, but limiting their employment growth.

Sales agents and adjusters still are needed to meet face-to-face with clients, many of whom prefer to talk directly with an agent, especially regarding complicated policies. Opportunities will be best for sales agents who sell more than one type of insurance or financial service. Adjusters will still be needed to inspect damage and interview witnesses, and although the number of available jobs for actuaries will be limited due to the small size of the occupation, employment opportunities should be good as stringent qualifying requirements resulting from the examination system limit the number of new entrants.

Sources of Additional Information

General information on employment opportunities in the insurance industry may be obtained from the human resources departments of major insurance companies or from insurance agencies in local communities. Information about licensing requirements for insurance sales agents and claim adjusters may be obtained from the department of insurance in each State.

For information on the property and casualty insurance industry, contact

- Insurance Information Institute, 110 William St., New York, NY 10038. Internet: <http://www.iii.org>

For information about careers in the life insurance industry, contact

- LIMRA International, P.O. Box 203, Hartford, CT 16141-0208.

For information about the health insurance industry, contact

- National Association of Health Underwriters, 2000 North 14th St., Suite 450, Arlington, VA 22201. Internet: <http://www.nahu.org>

For information about insurance sales careers and training, contact any of the following organizations:

- The American Institute for CPCU/Insurance Institute of America, 720 South Providence Rd., Malvern, PA 19355. Internet: <http://www.aicpcu.org>

- Independent Insurance Agents of America, 127 South Peyton St., Alexandria, VA 22314. Internet: <http://www.iaaa.org>
- Insurance Vocational Education Student Training (InVEST), 127 South Peyton St., Alexandria, VA 22314. Internet: <http://www.investprogram.org>
- National Association of Professional Insurance Agents, 400 North Washington St., Alexandria, VA 22314.

For information on insurance education and training, contact either of these organizations:

- The American College, 270 Bryn Mawr Ave., Bryn Mawr, PA 19010. Internet: <http://www.amercoll.edu>

- The National Alliance for Insurance Education and Research, P.O. Box 27027, Austin, TX 78755.

Information on the following insurance occupations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Actuaries
- Claims adjusters, appraisers, examiners, and investigators
- Insurance sales agents
- Insurance underwriters
- Customer service representatives

Securities, Commodities, and Other Investments

(NAICS 523)

SIGNIFICANT POINTS

- Half of all jobs in the industry are held by securities sales agents and management and financial operations workers, who generally have a college degree; the rest are mainly office and administrative support jobs.
- Employment is expected to grow as a result of increasing investment in securities and commodities, along with a growing need for investment advice.
- The Securities and Exchange Commission (SEC) and major stock exchanges are instituting accounting and corporate reforms to increase public confidence in the investment markets.
- The high earnings of successful securities sales agents will cause keen competition for these positions—particularly in larger firms.

Nature of the Industry

The securities, commodities, and other investments industry is made up of a variety of firms and organizations that bring together buyers and sellers of securities and commodities, manage investments, and offer financial advice. The industry is undergoing substantial change because of improvements in technology, deregulation of financial services, regulatory changes, the globalization of the marketplace, and demographics. The Internet, along with high-speed computer systems, has dramatically altered the way in which securities and commodities are bought and sold, almost completely automating the transaction process. At the same time, the number of financial services being offered is rising as firms look for new ways to attract the business of an increasingly wealthy and investment-savvy public.

The Securities and Exchange Commission (SEC) and major stock exchanges are instituting accounting and corporate reforms to increase public confidence in investment markets. For example, the SEC now requires corporate chief executive officers (CEOs) to certify the reliability of their companies' financial reports. The SEC is also considering measures that would help ensure that research reports are written independently by financial analysts. In addition, the New York Stock Exchange (NYSE) is considering new rules to separate investment banking more formally from company research.

One of the most important functions of the industry is to facilitate the trading of securities and commodities by bringing together buyers and sellers. Brokerage firms typically provide this function. In these firms, investors place their buy and sell orders for a particular security or commodity by telephone, online by computer, or through a broker. The firm fills the order in one of three ways. If the stock or commodity is sold on an exchange, such as the NYSE or the Chicago Mercantile Exchange (CME), the firm will send the order electronically to the company's floor broker at the exchange. The floor broker will then post the order and execute the trade by finding a seller or buyer who offers the best price for the client. Alternatively, if a security is sold through

a dealer network, such as Nasdaq, the broker can access a computer network that lists the prices for which dealers in that particular security are willing to buy or sell it. If a price that the client agrees with is found, then a purchase or sale is made. Large investors and brokerage firms also can buy and sell securities and commodities on "electronic communications networks," or ECNs—powerful computers that automatically list, match, and execute trades, eliminating the middleman. ECNs commonly are used for stocks that trade frequently and in large numbers.

Brokerage firms generally are classified as full-service, discount, or online organizations. Investors who do not have time to research investments on their own will likely rely on a full-service broker to help them construct an investment portfolio, manage their investments, or make recommendations regarding which investments to buy. Full-service brokers have access to a wide range of reports and analyses from the company's large staff of financial analysts. These analysts research companies and recommend investments to people with different financial needs. Persons who prefer to select their own investments generally use a discount or online broker and pay lower commission charges. Discount firms usually do not offer advice about specific securities. Online brokerage firms make their trades over the Internet in order to keep costs down and fees low. Discount brokerage firms usually have branch offices, while online firms do not. Most brokerage firms now have call centers staffed with both licensed sales agents and customer service representatives who take orders and answer questions at all hours of the day.

Brokerage firms also provide investment banking services; that is, they act as intermediaries between those companies or governments which would like to raise money and those with money or capital to invest. Investment banking usually involves the firm buying initial stock or bond offerings from private companies or from Federal, State, and local governments, and in turn selling them to investors for a potential profit. This service can be risky, especially when it involves a new company selling stock to the public for the first time. Investment bankers must try to

determine the value of the company on the basis of a number of factors, including projected growth and sales, and decide what price investors are willing to pay for the new stock. Investment bankers also advise businesses on merger and acquisition strategies and may arrange for the transfer of ownership.

Companies that specialize in providing investment advice, portfolio management, and trust, fiduciary, and custody activities also are included in this industry. These companies range from very large mutual-fund management companies to self-employed personal financial advisors, or financial planners. Also included are managers of pension funds, commodity pools, trust funds, and other investment accounts. Portfolio or asset management companies direct the investment decisions for investors who have chosen to pool their assets in order to have them professionally managed. Many brokerage firms also provide these services. Personal financial advisors can manage investments for individuals as well, but their main objective is to provide a comprehensive financial plan that meets a wide range of financial needs.

A relatively small number of professionals in the industry work in the exchanges, where the actual trading of securities and commodities takes place. Computers and their applications have made brokers in the exchanges much more productive and capable of handling ever-increasing volumes of trades.

Firms in this industry offer a number of other services. Many offer cash-management accounts that allow account holders to deposit money into a money market fund against which they can write checks, take out margin loans, or use a debit card. Some brokerage firms offer mortgages and other types of loans and lines of credit. They also may offer trust services and help businesses set up benefit plans for their employees. Finally, firms in the industry may sell annuities and other life insurance products.

The securities, commodities, and other investments industry has invested heavily in technology, allowing firms to handle larger volumes of trades with fewer people. The growth of online trading in particular has produced a number of online trading firms that did not exist just a few years ago. In order to compete, many full-service brokerage firms now offer online trading to their customers. This explosion in technology is changing the nature of many of the jobs and the mix of people employed by securities firms. Some companies are more likely to resemble information technology companies than securities firms, with most of the employees working in computer-related occupations. Across the industry, computer professionals are accounting for a greater proportion of the workforce. Moreover, with so much business now being conducted online and through call centers, traditional sales agents are spending less time processing orders and more time seeking out new clients and offering detailed advice.

Employment in each of the segments of the securities, commodities, and other investments industry is directly affected by the activity of the stock market and futures market and the savings and investment goals of individuals. Because these factors are determined largely by the strength of the economy, the industry prospers during good economic times, but is much more adversely affected by downturns than are many other industries.

Working Conditions

Most people in this industry work in comfortable offices; however, long hours, including evenings and weekends, are common. Nearly one-fourth of employees worked 50 hours per week or more in 2002. Even when not working, professionals in the industry must keep abreast of events that may affect the markets in which they specialize. Opportunities for part-time work are limited—only about 8 percent worked part time, compared to 16 percent of workers in all industries. In 2002, the incidence of work-related injury and illness was only 0.5 cases per 100 full-time workers, much lower than the 5.3 cases per 100 workers for the entire private sector. Working conditions vary by occupation.

Securities sales agents who deal mostly with individual investors and small businesses often work in branch offices of regional or national brokerage firms or for a small brokerage or financial-planning firm. New sales agents work long hours, mostly soliciting customers. During the day they are on the phone continually with prospective customers, while at night they may attempt to generate new business by giving classes or seminars or by attending community functions. New sales agents also spend many hours studying to pass a variety of tests that will qualify them to sell other investment products, such as commodities or insurance. Although established agents work more regular hours, all agents meet with clients in the evenings and on weekends, as needed.

Sales agents who actually perform the buying and selling of securities and commodities may have one of the most hectic jobs of any profession. Often called traders, market makers, dealers, or floor brokers, they work on the floors of exchanges or at a computer that is linked to other traders. They not only take orders from clients and try to get the best price for them, but also must constantly keep an eye on market activity and stay in touch with other traders and brokers to know what prices are being offered.

Increasingly, sales agents for many of the brokerage and mutual fund companies work in call centers, opening accounts for individuals, entering trades, and providing advice over the phone on different investment products. Although many simply respond to inquiries and do not actively solicit customers, others may be required to contact potential clients. Call centers also employ a large number of customer service representatives, who answer questions for current clients about their accounts and make any needed changes or transfers. All workers in call centers must maintain a professional and courteous attitude, work well under pressure, and be able to speak for long periods of time. Many call centers operate 24 hours a day, 7 days a week, and employees may be required to work evenings and weekends.

Jobs in investment banking, including those of financial managers, analysts, or assistants, generally require the longest hours—often 70 to 80 hours per week—in addition to extensive travel. In this area, there is a great deal of pressure to meet deadlines and acquire new business. Researchers, financial analysts, and investment managers working for brokerage and mutual-fund firms also work long hours, researching and evaluating

companies and their markets. Frequent travel to visit companies is common.

Personal financial advisors work in offices or out of their homes. Most work regular business hours, but many accommodate clients by visiting them at their homes in the evenings or on weekends. Office and administrative support workers usually work a 40-hour week, but overtime may be necessary during times of heavy trading.

Employment

The securities, commodities, and other investments industry employed 801,000 wage and salary workers in 2002. An additional 95,000 workers were self-employed. With their extensive networks of retail sales representatives located in branch offices throughout the country, the large nationally known brokerage companies operate the majority of establishments in this industry. Over 90 percent of the establishments in the industry employ fewer than 20 workers (chart). However, about half of the industry's jobs are in the headquarters of many of these firms—where most executives and administrative support personnel are employed—many of which are located in the New York City area. Many people also work for mutual-fund management companies and smaller regional brokerage firms. As a consequence of deregulation, banks have been either acquiring securities firms or adding securities and commodities business to their list of services, hence becoming a factor in the industry. A relatively small number of employees work at securities or commodities exchanges—primarily the NYSE, the Chicago Board of Trade, the CME, and a number of regional exchanges.

Occupations in the Industry

Securities, commodities, and financial services sales agents account for 1 in 5 wage and salary jobs in this industry (table 1). Although the occupation encompasses a variety of job titles and activities, all of them involve placing orders or buying and sell-

ing securities, commodities, or other financial services. The most common types of sales agents deal directly with the public and often are called retail brokers, account executives, registered representatives, or financial consultants. Securities brokers typically buy and sell stocks, bonds, mutual funds, and other financial services, while commodities brokers deal primarily with futures contracts on metals, energy supplies, agricultural products, and financial instruments.

When a client places an order for one of these items, brokers relay the order through the firm's computers to the floor of an exchange, to a dealer, or to an ECN. Upon confirmation of the trade, the broker notifies clients of the final price. As part of their job, brokers often provide advice to clients about possible investments, taking into consideration the client's financial situation, tolerance for risk, and savings needs. Because sales is one of their major responsibilities, brokers also spend a considerable amount of time soliciting new business.

A small number of sales agents deal exclusively with large investors, such as insurance companies, pension funds, and mutual funds. These agents typically are called institutional representatives or institutional brokers, and they provide many of the same services as a retail broker, but on a larger scale.

Sales agents referred to as traders, market makers, or floor brokers actually make the trades on the floor of the exchange or over the computer. These agents match buyers and sellers of a particular security or commodity, sometimes using their own or their firm's money to close the deal.

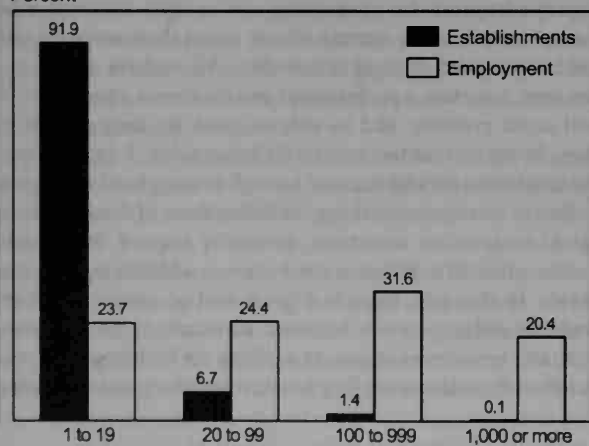
Keeping track of transactions and paperwork constitutes a large portion of the work in this industry, which is why its largest occupational group is office and administrative support workers. *Brokerage clerks*, the largest occupation in this category, handle much of the day-to-day operations within a brokerage firm. The largest group of brokerage clerks, called sales assistants, takes calls from brokers' clients, writes up order tickets and enters them into the computer, handles the paperwork for new accounts, informs clients of stock prices, and performs other tasks as needed. Some sales assistants obtain licenses to sell securities, allowing them to call brokers' clients with recommendations from the broker regarding specific investments. Other brokerage clerks may compute transfer taxes and dividends and keep daily records of transactions and holdings. At some companies, a number of brokerage clerk positions are considered entry level, with promotion potential to securities sales agent jobs or other higher level jobs.

Because more clients are choosing to trade without the use of sales agents or brokers, *customer service representatives* are playing a larger role in securities firms. While some may have licenses to sell securities or other financial products, most are not in the business of sales or offering advice, but mainly take questions from current customers. Customer service representatives usually work in central call centers, where they handle account transfers, redemptions, and address changes; answer tax questions; and help clients navigate the Web, among other services.

Management, business, and financial occupations account for 28 percent of total employment, a larger proportion than in most industries. This category includes a myriad of people with expertise in finance and investment policy; *accountants and au-*

More than 9 out of 10 establishments in the securities, commodities and other investments industry employ fewer than 20 workers

Percent



ditors, who prepare the firm's financial statements; and *general and operations managers*, who run the business. *Financial analysts* generally work in the research and investment banking departments, reviewing financial statements of companies, evaluating economic and market trends, and making recommendations concerning the potential profits from investments in specific companies. Financial analysts also may attempt to determine fair market values for companies wishing to trade their stocks publicly or for those firms involved in mergers or acquisitions. Analysts in large firms usually specialize in a certain industry sector, such as finance, transportation, or utilities, or in a market, such as government financing.

Personal financial advisors, also called financial planners, provide advice to both individuals and businesses on a broad range of financial subjects, such as investments, retirement planning, tax management, estate planning, and employee benefits. They may take a comprehensive approach to the client's financial needs or address only a specific issue. Advisors also may buy and sell financial products, such as stocks, bonds, mutual funds, and insurance, for their clients.

Financial managers are employed throughout the industry, preparing financial documents for the regulatory authorities or directing a firm's investment policies. In many departments, managers act as senior advisors and oversee teams of junior analysts or brokers while continuing to be actively involved in working out deals with clients. Portfolio managers and commodity trading advisors are responsible for making investment decisions for clients with large sums of money to invest. These clients include mutual funds, pension funds, trust funds, commodity pools, and individuals with high net worth. Portfolio managers must know the investment goals of their clients and ensure that the investments they make meet those goals.

The increasingly computerized environment in this industry requires the expertise of *computer software engineers*, *computer programmers*, and other computer specialists to develop and operate the communications networks that provide online trading.

Training and Advancement

The securities, commodities, and other investments industry has one of the most highly educated and skilled workforces of any industry, and the requirements for entry are high—even brokerage clerks often have a college degree. The most successful workers at all levels have an aptitude for numbers and a keen interest in investing. In addition, most people in the industry are required to be licensed by the National Association of Securities Dealers (NASD) before they can sell securities or recommend specific investments. To be licensed, brokers and assistants must pass an examination that tests their knowledge of investments. Various licenses are available for different investment products; however, the one most brokers and broker's assistants receive is the "Series 7" license, which requires a passing score on the General Securities Registered Representative Examination administered by the NASD. Since 1995, the NASD also has required all registered persons with licenses to undergo a continuing education program approximately every 3 years in order

Table 1. Employment of wage and salary workers in securities, commodities, and other investments by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	801	100.0	15.5
Management, business, and financial occupations	228	28.4	29.2
Chief executives	9	1.1	28.1
General and operations managers	20	2.5	24.4
Advertising, marketing, promotions, public relations, and sales managers	10	1.3	33.2
Marketing and sales managers	9	1.1	34.3
Administrative services managers	6	0.8	21.6
Computer and information systems managers	6	0.8	36.1
Financial managers	32	4.0	24.0
Management analysts	7	0.9	28.1
Accountants and auditors	15	1.9	27.5
Financial analysts	33	4.1	16.1
Personal financial advisors	40	4.9	45.7
All other financial specialists	12	1.6	28.3
Professional and related occupations	60	7.5	31.0
Computer programmers	8	1.0	9.1
Computer software engineers	9	1.1	35.6
Computer support specialists	7	0.9	28.3
Market research analysts	5	0.6	22.7
Sales and related occupations	201	25.1	10.2
First-line supervisors/managers of non-retail sales workers	7	0.8	24.1
Securities, commodities, and financial services sales agents	174	21.7	9.0
Telemarketers	7	0.9	-4.2
Other sales and related workers	15	1.8	11.6
Office and administrative support occupations	303	37.8	5.6
First-line supervisors/managers of office and administrative support workers	21	2.7	10.0
Bookkeeping, accounting, and auditing clerks	21	2.6	9.4
Brokerage clerks	61	7.7	-16.1
Customer service representatives	45	5.7	28.4
Receptionists and information clerks	8	1.0	28.2
Executive secretaries and administrative assistants	40	4.9	8.4
Secretaries, except legal, medical, and executive	16	2.0	-1.0
Data entry and information processing workers	5	0.6	-13.3
Mail clerks and mail machine operators, except postal service	5	0.6	-7.6
Office clerks, general	40	5.0	11.7

NOTE: May not add to totals due to omission of occupations with small employment.

to retain their licenses. Classes consist of computer-based training in regulatory matters and training on new investment products.

A number of professionals in this industry begin their careers as brokerage clerks. Depending on the actual job, brokerage clerks can be high school or college graduates. Positions dealing with the public, such as broker's or sales assistant, and those dealing with more complicated financial records are increasingly being held by college graduates. In addition, these jobs require good organizational ability, phone skills, and attention to detail. A Series 7 brokerage license can make a clerk more valuable to the broker because it gives the assistant the ability to answer more of a client's questions and to pass along securities recommendations from the broker. Clerks may be promoted to sales representative positions or other professional positions. Some of the larger firms have training programs, especially for their college graduates, that provide clerks with the skills they need for advancement.

A college education, although not essential, is increasingly important for securities, commodities, and financial services sales agents because it helps them to understand economic conditions and trends. In fact, the overwhelming majority of entrants to this occupation are college graduates. Still, many employers consider personal qualities and skills, such as self-motivation and the ability to handle rejection, more important than academic training. Many employers prefer persons who have been successful in other sales careers. Employers seek applicants with good communication skills, a professional appearance, and a strong desire to succeed.

Securities, commodities, and financial services sales workers must meet Federal and State licensing requirements, which generally include passing an examination and a background investigation and, in some cases, furnishing a personal bond. Most of the large brokerage firms provide formal classroom training for new brokers that can last a couple of weeks to several months. Smaller firms usually rely on informal on-the-job training.

Although there are no specific licensure requirements for becoming a personal financial advisor, most advisors must be knowledgeable about economic trends, finance, budgeting, and accounting. Therefore, a college education is important. Personal financial advisors must possess excellent communication and interpersonal skills to be able to explain complicated issues to their clients. Many advisors earn a Certified Financial Planner credential, also referred to as CFP (R), issued by the CFP Board of Standards, Inc., or a Chartered Financial Consultant (ChFC) designation offered by the American College in Bryn Mawr, Pennsylvania. To receive these designations, a person must pass a series of exams on insurance, investments, tax planning, employee benefits, and retirement and estate planning; must have the required experience in related jobs; and, in the case of the CFP (R), must agree to abide by the rules and regulations issued by the Board of Standards. The CFP (R) exam has been revised in recent years in response to changes in the industry. Candidates are now required to have a working knowledge of debt management, planning liability, emergency fund reserves, and statistical modeling. It may take from 2 to 3 years of study to complete these programs.

Entry-level financial analyst and other managerial support positions usually are filled by college graduates who have majored in business administration, marketing, economics, accounting, industrial relations, or finance. Many of the large companies

have management training programs for college graduates in which trainees work for brief periods in various departments to get a broad picture of the industry before they are assigned to a particular department. Those working as financial analysts are encouraged to obtain the Chartered Financial Analyst (CFA) designation sponsored by the Association of Investment Management and Research. To qualify, applicants must have at least 3 years of qualifying experience and pass a series of rigorous essay exams requiring an extensive knowledge of many areas, including accounting, economics, and securities.

Advancement opportunities in the securities, commodities, and other investments industry vary by occupation. To advance into the managerial ranks or enter some of the more lucrative and prestigious jobs on Wall Street, a master's degree is increasingly becoming essential. In investment banking, for example, most firms select the top candidates from the Nation's most prestigious business schools. However, because many business schools accept master's degree candidates only if they have some job experience, many securities firms hire analysts with a bachelor's degree and provide them with the experience they need, assuming that they will eventually obtain their master's degree.

The principal basis of advancement for securities, commodities, and financial services sales agents is an increase in the number and size of the accounts they handle. Some eventually manage the assets of clients. Although beginners usually service the accounts of individual investors, a select few eventually may handle very large institutional accounts. Administrative support workers such as brokerage clerks may advance to sales agent positions or to other professional positions. Financial analysts may advance to positions in which they manage investment portfolios or negotiate investment banking deals.

Earnings

Most workers in the securities, commodities, and other investments industry are paid a salary on an annual or a weekly basis. In 2002, the average weekly earnings of nonsupervisory workers in the industry were \$847, compared with \$506 in all industries combined. Median earnings for the largest occupations in the

Table 2. Median hourly earnings of the largest occupations in securities, commodities, and other investments, 2002

Occupation	Securities, commodities, and other investments	All industries
General and operations managers	\$50.22	\$32.80
Securities, commodities, and financial services sales agents	37.31	29.32
Personal financial advisors	33.94	27.25
Financial analysts	31.74	27.45
First-line supervisors/managers of office and administrative support workers	20.88	18.66
Executive secretaries and administrative assistants	18.78	16.06
Bookkeeping, accounting, and auditing clerks	16.61	13.16
Brokerage clerks	16.34	15.97
Customer service representatives	14.82	12.62
Office clerks, general	11.40	10.71

securities, commodities, and other investments industry in 2002 are presented in table 2.

Earnings of securities, commodities, and financial services sales agents—especially those working for full-service brokerage firms—depend in large part on commissions from the sale or purchase of stocks, bonds, and other securities or futures contracts. Commissions are likely to be lower when there is a slump in market activity. Earnings also can be based on the amount of assets that a broker or portfolio manager has under his or her management, with the broker or portfolio manager receiving a small percentage of the value of the assets.

Personal financial advisors are compensated in a number of ways. Those who manage client's assets usually collect a percentage of the assets as their fees. Others charge hourly fees, and some charge different rates, depending on the type of plan requested. Many receive commissions based on the financial products they sell. Those who work for financial services firms may receive a salary.

For many in the industry, a large part of their earnings come from annual bonuses based on the success of the firm. Profit sharing and stock options also are common. Salaried employees are more likely to receive typical benefits, such as paid vacations, sick leave, and pension plans, than are self-employed workers.

Outlook

Wage and salary employment in securities, commodities, and other investments is projected to rise 15.5 percent from 2002 to 2012, about as fast as the 16.3-percent increase expected for all industries in the economy. Employment growth will be driven primarily by increasing levels of investment in securities and commodities in the global marketplace. In addition to the many new job openings stemming from this growth, a large number of openings will arise as people retire or leave the industry for other reasons.

Baby boomers are in the middle of their peak saving years, and many are putting money into a number of tax-favorable retirement plans, such as 401(k) programs and Roth IRAs. These plans have been one of the major causes of inflows of money into the stock market and into mutual funds, and this trend towards saving for retirement is expected to continue.

Another factor contributing to projected employment growth is the "globalization" of securities and commodities markets—the extension of traditional exchange and trading boundaries into new markets in foreign countries. This extension, in turn, has provided an expanding array of investment opportunities and access to markets in which new financial products are now available to domestic investors. These new products and markets encourage trading and prompt firms to hire more workers.

Also, although online trading will grow and reduce the need for direct contact with an actual broker, the number of securities sales agents is still expected to increase, as many people will remain willing to pay for the advice that a full-service representa-

tive can offer. Competition for securities sales agent jobs, though, is expected to be keen, because the job attracts a large number of qualified applicants. Job opportunities for sales agents should be best for mature individuals with successful work experience.

Employment of personal financial advisors is expected to increase rapidly. As the number of self-directed retirement plans grows, and as the number of investments rises and their complexity increases, individuals will require more help to manage their money. Financial advisors who have either the CFP (R) or ChFC designation are expected to have the best opportunities.

Financial analysts will be needed in the investment banking field, where they help companies raise money and where they work on corporate mergers and acquisitions. However, growth in demand for financial analysts to do company research will be constrained by the implementation of reform proposals calling for investment firms to subsidize independent research boutiques and separate research from investment banking. Firms may try to contain the costs of reform by eliminating research jobs. Competition for entry-level analyst positions in investment banking typically is intense, as the number of applicants usually far exceeds the number of vacancies.

Due to advances in telecommunications and computer technology, the securities, commodities, and other investments industry has become highly automated. On the one hand, this automation is expected to cause rapid growth in employment of computer software engineers and other computer specialists. On the other hand, automation has resulted in computerized recordkeeping of transactions, more productive office and administrative support staffs, and enhanced communications with foreign firms. Accordingly, employment of brokerage clerks and secretaries will decline, and employment of bookkeeping, accounting, and auditing clerks is projected to grow more slowly than the average for the industry.

Sources of Additional Information

For general information on the securities industry, contact:

- Securities Industry Association, 120 Broadway, New York, NY 10271.

Detailed information on many key occupations in the securities, commodities, and other investments industry, including the following, may be found in the 2004-05 edition of the *Occupational Outlook Handbook*:

- Brokerage clerks
- Financial managers
- Financial analysts and personal financial advisors
- Securities, commodities, and financial services sales agents

Professional and Business Services



Advertising and Public Relations Services

(NAICS 5418)

SIGNIFICANT POINTS

- California and New York together account for about 1 in 5 firms and more than 1 in 4 workers in the industry.
- Competition for many jobs will be keen because the glamour of the industry traditionally attracts many more jobseekers than there are job openings.
- Layoffs are common when accounts are lost, major clients cut budgets, or agencies merge.

Nature of the Industry

Firms in the advertising and public relations services industry prepare advertisements for other companies and organizations and design campaigns to promote the interests and image of their clients. This industry also includes media representatives—firms that sell advertising space for publications, radio, television, and the Internet; display advertisers—businesses engaged in creating and designing public display ads for use in shopping malls, on billboards, or in similar media; and direct mail advertisers. A firm that purchases advertising time (or space) from media outlets, thereafter reselling it to advertising agencies or individual companies directly, is considered a media buying agency. Divisions of companies that produce and place their own advertising are not considered part of this industry.

There are 47,000 advertising and public relations services establishments in the United States. About 4 out of 10 write copy and prepare artwork, graphics, and other creative work, and then place the resulting ads on television, radio, or the Internet or in periodicals, newspapers, or other advertising media. Within the industry, only these full-service establishments are known as *advertising agencies*. Almost 1 in 5 are public relations firms. Many of the largest agencies are international, with a substantial proportion of their revenue coming from abroad.

Most advertising firms specialize in a particular market niche. Some companies produce and solicit outdoor advertising, such as billboards and electric displays. Others place ads in buses, subways, taxis, airports, and bus terminals. A small number of firms produce aerial advertising, while others distribute circulars, handbills, and free samples.

Groups within agencies have been created to serve their clients' electronic advertising needs on the Internet. Online advertisements link users from one Web site to a company's or product's Web site, where information such as new product announcements, contests, and product catalogs appears, and from which purchases may be made.

Some firms are not involved in the creation of ads at all; instead, they sell advertising time or space on radio and television stations or in publications. Because these firms do not produce advertising, their staffs are mostly sales workers.

Companies often look to advertising as a way of boosting sales by increasing the public's exposure to a product. Most companies do not have the staff with the necessary skills or experience to create effective advertisements; furthermore, many

advertising campaigns are temporary, so employers would have difficulty maintaining their own advertising staff. Instead, companies commonly solicit bids from ad agencies to develop advertising for them. Next, ad agencies offering their services to the company often make presentations. The real work for ad agencies begins when they win an account. Various departments within an agency—such as creative, production, media, and research—work together to meet the client's goal of increasing sales.

Widespread public relations services firms influence how businesses, governments, and institutions make decisions and, in so doing, affect the lives of all Americans. Often working behind the scenes, these firms have a variety of functions. In general, firms in public relations services advise and implement public exposure strategies. For example, a public relations firm might issue a press release that is printed in newspapers across the country. Firms in public relations services offer one or more resources that clients cannot provide themselves. Usually this resource is expertise—in the form of knowledge, experience, special skills, or creativity, but sometimes the resource is time or personnel that the client cannot spare. Clients of public relations firms include all types of businesses, institutions, trades, and public interest groups, and even some high-profile individuals. Clients are large and small for-profit firms in the private sector; bodies of State, local, or Federal Government; institutions, such as hospitals, universities, unions, and trade groups; and foreign governments or businesses.

Public relations firms help secure favorable public exposure for their clients, advise them in the case of a sudden public crisis, and design strategies to help them attain a certain public image. Toward these ends, public relations firms analyze public or internal sentiment about clients; establish relationships with the media; write speeches and coach clients for interviews; issue press releases; and organize client-sponsored publicity events, such as contests, concerts, exhibits, symposia, and sporting and charity events.

Lobbying firms, a special type of public relations firm, differ somewhat. Instead of attempting to secure favorable public opinion about their clients, they attempt to influence legislators in favor of their clients' special interests. Lobbyists often work for large businesses, industry trade organizations, unions, or public interest groups.

The vast majority of firms in the public relations services segment are small, primarily because new firms, particularly those engaged in consulting and public relations, can easily enter the industry.

In an effort to attract and maintain clients, advertising and public relations services agencies are diversifying their services, offering advertising as well as public relations, sales, marketing, and interactive media services. Advertising and public relations services firms have found that highly creative work is particularly suitable for their services, resulting in a better product and increasing their clients' profitability.

Working Conditions

Most employees in advertising and public relations services work in comfortable offices operating in a teamwork environment; however, long hours, including evenings and weekends, are common. There are fewer opportunities for part-time work than in many other industries; in 2002, 14.5 percent of advertising and public relations employees worked part time, compared with 15.8 percent of all workers.

Work in advertising and public relations is fast-paced and exciting, but it can also be stressful. Being creative on a tight schedule can be emotionally draining. Some workers, such as lobbyists, consultants, and public relations writers, frequently must meet deadlines and consequently may work long hours at times. Workers whose services are billed hourly—such as advertising consultants and public relations specialists—are often under pressure to manage their time carefully. In addition, frequent meetings with clients and media representatives may involve substantial travel.

Most firms encourage employees to attend employer-paid time-management classes. This helps reduce the stress sometimes associated with working under strict time constraints. Also, with today's hectic lifestyle, many firms in this industry offer or provide health facilities or clubs to help employees maintain good health.

In 2002, workers in the industry averaged 34.2 hours per week, a little above the national average of 33.9.

Employment

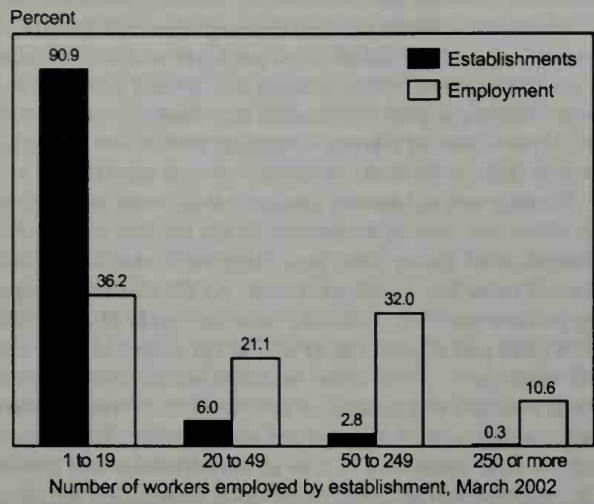
The advertising and public relations services industry employed 442,000 workers in 2002. An additional 56,000 workers were unincorporated self-employed workers.

Although advertising and public relations services firms are located throughout the country, they are concentrated in the largest States and cities. California and New York together account for about 1 in 5 firms and more than 1 in 4 workers in the industry. Firms vary in size, ranging from one-person shops to international agencies employing thousands of workers. However, over half of all advertising and public relations establishments employ fewer than 20 employees (See chart).

The small size of the average advertising and public relations services firm demonstrates the opportunities for self-employment. It is relatively easy to open a small agency; in fact, many successful agencies began as one- or two-person operations.

Almost three-quarters percent of advertising and public relations employees are 25 to 54 years of age. Very few advertising

More than half of all jobs in advertising and public relations services are in establishments with fewer than 50 employees



and public relations services workers are below the age of 20, which reflects the need for postsecondary training or work experience.

Occupations in the Industry

Management, business, and financial workers; professionals and related workers; and sales and related workers account for nearly 6 of every 10 jobs in the industry (table 1). Employees have varied responsibilities in agencies with only a few workers, and the specific job duties of each worker often are difficult to distinguish. Workers in relatively large firms specialize more, so the distinctions among occupations are more apparent.

Within advertising and public relations, the account management department links the agency and the client. It represents the agency to the client, as well as the client to the agency. Account management brings business to the agency and ultimately is responsible for the quality of the advertisement or public relations campaign. Account management workers carefully monitor the activities of the other areas to ensure that everything runs smoothly. *Account managers* and their assistants analyze competitive activity and consumer trends, report client billing, forecast agency income, and combine the talents of the creative, media, and research areas. The *creative director* oversees the copy chief, art director, and their respective staffs. The *media director* oversees planning groups that select the communication media—for example, radio, television, newspapers, magazines, Internet, or outdoor signs—to be used to promote the organization, issue, or product.

In public relations firms, *public relations managers* direct publicity programs to a targeted public. They often specialize in a specific area, such as crisis management—or in a specific industry, such as healthcare. They use every available communication medium in their effort to maintain the support of the specific group upon whom their organization's success depends, such as consumers, stockholders, or the general public. For example,

public relations managers may clarify or justify the firm's point of view on health or environmental issues to community or special interest groups. *Public relations specialists* handle organizational functions such as media, community, consumer, and governmental relations; political campaigns; interest-group representation; conflict mediation; or employee and investor relations. They prepare press releases and contact people in the media who might print or broadcast their material. Many radio or television special reports, newspaper stories, and magazine articles start on the desks of public relations specialists.

Working with an idea that account management obtains from the client, the creative department brings the idea to life. For example, an ad agency's staff works together to transform a blank piece of paper into an advertisement. As the idea takes shape, *copywriters* and their assistants write the words of ads—both the written part of print ads as well as the scripts of radio and television spots. *Art directors* and their assistants develop the visual concepts and designs of advertisements. They prepare pasteups and layouts for print ads and television storyboards, cartoon-style summaries of how an advertisement will appear. They also oversee the filming of television commercials and photo sessions. *Graphic designers* use a variety of print, electronic, and film media to create designs that meet clients' commercial needs. Using computer software, they develop the overall layout and design of print ads for magazines, newspapers, journals, corporate reports, and other publications. They also may produce promotional displays and marketing brochures for products and services, design distinctive company logos for products and businesses, and develop signs and environmental graphics—aesthetically pleasing signs that deliver a message, such as a sunset to advertise a beach resort. An increasing number of graphic designers develop material to appear on the Internet.

Workers in the research department try to understand the desires, motivations, and ideals of consumers, in order to produce and place the most effective advertising or public relations campaign in the most effective media. *Research executives* compile data, monitor the progress of internal and external research, develop research tools, and interpret and provide explanations of the data gathered. Research executives often specialize in specific research areas and perform supervisory duties. *Market research analysts* are concerned with the potential sales of a product or service. They analyze statistical data on past sales to predict future sales. They provide a company's management with information needed to make decisions on the promotion, distribution, design, and pricing of products or services.

Media planners gather information on the public's viewing and reading habits, and evaluate editorial content and programming to determine the potential use of media such as newspapers, magazines, radio, television, or the Internet. The media staff calculates the numbers and types of people reached by different media, and how often they are reached. *Media buyers* track the media space and times available for purchase, negotiate and purchase time and space for ads, and make sure ads appear exactly as scheduled. Additionally, they calculate rates, usage, and budgets. *Advertising sales agents* sell air time on radio and television, and page space in print media. They generally work in firms representing radio stations, television stations, and publi-

cations. *Demonstrators* promote sales of a product to consumers, while *product promoters* try to induce retail stores to sell particular products and market them effectively. Product demonstration is an effective technique used by both to introduce new products or promote sales of old products because it allows face-to-face interaction with potential customers.

Office and administrative support occupations accounted for 3 out of 10 jobs in 2002. Positions ranged from secretaries and administrative assistants to financial clerks. The occupational composition of this group varies widely among agencies. The remaining jobs in the industry were in service, construction and extraction, production, transportation, and installation, maintenance, and repair occupations.

Training and Advancement

Most entry-level professional and managerial positions in advertising and public relations services require a bachelor's degree, preferably with broad liberal arts exposure.

Beginners in advertising usually enter the industry in the account management or media department. Occasionally, entry-level positions are available in the market research or creative departments of an agency, but these positions usually require some experience. Completing an advertising-related internship while in school provides an advantage when applying for an entry-level position; in fact, internships are becoming a necessary step to obtaining permanent employment. In addition to an internship, courses in marketing, psychology, accounting, statistics, and creative design can help prepare potential entrants for careers in this field.

Assistant account executive, the entry-level account management position in most firms, requires a bachelor's degree in marketing or advertising. At some agencies, a master's degree in business administration may be required.

Bachelor's degrees are not required for entry-level positions in the creative department. Assistant art directors usually need at least a 2-year degree from an art or design school. Although assistant copywriters do not need a degree, obtaining one helps to develop the superior communication skills and abilities required for this job.

Assistant media planner or assistant media buyer also are good entry-level positions, but almost always require a bachelor's degree, preferably with a major in marketing or advertising. Experienced applicants who possess at least a master's degree usually fill research positions. Often, they have a background in marketing or statistics and years of experience. Requirements for support services and administrative positions depend on the job and vary from firm to firm.

In public relations, employers prefer applicants with degrees in communications, journalism, English, or business. Some 4-year colleges and universities have begun to offer a concentration in public relations. Because there is keen competition for entry-level public relations jobs, workers are encouraged to gain experience through internships, co-op programs, or one of the formal public relations programs offered across the country. However, these programs are not available everywhere, so most public relations workers get the bulk of their training on the job. At some firms, this training consists of formal classroom education but, in most cases, workers train under the guidance of se-

Table 1. Employment of wage and salary workers in advertising and public relations services by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	442	100.0	18.9
Management, business, and financial occupations	78	17.6	30.5
Top executives	20	4.6	22.1
Marketing managers	5	1.6	37.4
Operations specialties managers	10	2.8	25.1
Buyers and purchasing agents	5	1.2	23.6
Accountants and auditors	5	1.0	24.3
Professional and related occupations	94	21.3	22.4
Computer specialists	16	3.5	29.0
Art directors	8	1.9	11.4
Multi-media artists and animators	5	1.1	12.4
Graphic designers	18	4.2	24.9
Public relations specialists	16	3.6	37.4
Writers and authors	6	1.3	10.7
Sales and related occupations	88	20.0	23.0
First-line supervisors/managers of non-retail sales workers	5	1.1	28.3
Advertising sales agents	37	8.3	24.9
Sales representatives, wholesale and manufacturing	12	2.7	24.9
Demonstrators and product promoters	18	4.0	26.6
Telemarketers	6	1.4	-6.7
Office and administrative support occupations	126	28.6	6.9
First-line supervisors/managers of office and administrative support workers	10	2.2	7.1
Bookkeeping, accounting, and auditing clerks	10	2.2	6.6
Customer service representatives	10	2.3	24.9
Receptionists and information clerks	5	1.2	24.9
Production, planning, and expediting clerks	6	1.4	24.9
Secretaries and administrative assistants	20	4.4	3.8
Mail clerks and mail machine operators, except postal service	20	4.6	-2.3
Office clerks, general	13	2.9	8.8
Construction and extraction occupations	5	1.1	25.8
Production occupations	28	6.4	16.4
Printers	71.6	8.5	
Transportation and material moving occupations	16	3.7	15.3
Laborers and freight, stock, and material movers, hand	5	1.1	2.6
Packers and packagers, hand	6	1.3	21.6

NOTE: May not add to totals due to omission of occupations with small employment.

nior account executives or other experienced workers, gradually familiarizing themselves with public relations work. Entry-level workers often start as research or account assistants and may be promoted to account executive, account supervisor, vice president, and executive vice president.

Voluntary accreditation programs for public relations specialists and management consultants, respectively, are offered by the Public Relations Society of America and the Institute of Management Consultants. Both programs are recognized marks of competency in the profession and require that workers have been employed in the field for several years.

Employees in advertising and public relations services should have good people skills, common sense, creativity, communication skills, and problem-solving ability. Foreign language skills have always been important for those wanting to work abroad for domestic firms or to represent foreign firms domestically. However, these skills are increasingly vital to reach linguistic minorities in U.S. cities such as Los Angeles, New York, Miami, Houston, and Phoenix. New media, such as the Internet, are creating opportunities to market products, but are also increasing the need for additional training for those already employed. Keeping pace with technology is fundamental to success in the industry. Besides staying abreast of new technology, advertisers must keep in tune with the changing values, cultures, and fashions of the Nation.

Success in progressively responsible staff assignments usually leads to advancement to supervisory positions. As workers climb the organizational ladder, broad vision and planning skills become extremely important. Another way to get to the top in this industry is to open one's own firm. In spite of the difficulty and high failure rate, many find starting their own business to be personally and financially rewarding. Among the self-employed, advancement takes the form of increasing the size and strength of the company.

Earnings

In 2002, nonsupervisory workers in advertising and public relations services averaged \$602 a week—significantly higher than the \$506 a week for all nonsupervisory workers in private industry. Earnings of workers in selected occupations in advertising and public relations services appear in table 2.

In addition to a straight salary, many workers receive additional compensation, such as profit sharing, stock ownership, or performance-based bonuses.

Table 2. Median hourly earnings of the largest occupations in advertising and public relations, 2002

Occupation	Advertising and public relations	All industries
General and operations managers	\$46.43	\$32.80
Public relations specialists	23.11	20.05
Sales representatives, wholesale and manufacturing, except technical and scientific products	21.08	20.54
Advertising sales agents	20.93	18.11
Graphic designers	18.99	17.64
Executive secretaries and administrative assistants	16.86	16.06
Customer service representatives	14.12	12.62
Office clerks, general	10.78	10.71
Mail clerks and mail machine operators, except postal service	9.15	10.19
Demonstrators and product promoters	8.27	9.80

Only 2 percent of workers in advertising and public relations services belong to unions or are covered by union contracts, compared with about 15 percent of workers in all industries combined.

Outlook

Competition for many jobs will be keen because the glamour of the advertising and public relations services industry traditionally attracts many more jobseekers than there are job openings. Employment in the industry is projected to grow 19 percent over the 2002-12 period, compared with 16 percent for all industries combined. New jobs will be created as an expanding economy generates more products and services to advertise. Increased demand for advertising and public relations services also will stem from growth in the number and types of media outlets used to reach consumers, creating opportunities for people skilled in preparing material for presentation on the Internet.

On the other hand, employment growth may be tempered by the increased use of more efficient nonprint media advertising, such as Internet or radio, which could replace some workers. Employment also may be adversely affected if legislation, aimed at protecting public health and safety, further restricts advertising for specific products such as alcoholic beverages and tobacco. In addition to new jobs created over the 2002-12 period, job openings also will arise as workers transfer to other industries or stop working.

Layoffs are common in advertising and public relations services firms when accounts are lost, major clients cut budgets, or agencies merge.

Sources of Additional Information

For information about careers or training contact:

- American Association of Advertising Agencies, 405 Lexington Ave., New York, NY 10174. Internet: <http://www.aaaa.org>

For a brochure on careers in public relations, contact:

- Public Relations Society of America, Inc., 33 Irving Place, New York, NY 10003. Internet: <http://www.prsa.org>
- International Association of Business Communicators, One Hallidie Plaza, Suite 600, San Francisco, CA 94102.

Information on these occupations can be found in the 2004-05 edition of the *Occupational Outlook Handbook*:

- Artists and related workers
- Advertising, marketing, promotions, public relations, and sales managers
- Demonstrators, product promoters, and models
- Market and survey researchers
- Public relations specialists
- Television, video, and motion picture camera operators and editors
- Writers and editors

Computer Systems Design and Related Services

(NAICS 5415)

SIGNIFICANT POINTS

- The computer systems design and related services industry is expected to be one of the top 10 fastest growing industries in the economy, adding more than 600,000 jobs between 2002 and 2012.
- Professional and related workers enjoy the best prospects, reflecting continuing demand for higher level skills needed to keep up with changes in technology.
- Computer specialists account for 53 percent of all employees in this industry.

Nature of the Industry

All organizations today rely on computer and information technology to conduct business and operate more efficiently. Often, however, these institutions do not have the internal resources to effectively implement new technologies or satisfy their changing needs. When this happens, they turn to the computer systems design and related services industry to meet their specialized needs on a contract or customer basis. Firms may enlist the services of one of nearly 146,000 establishments in the computer systems design and related services industry for help with a particular project or problem, such as setting up a secure Web site or establishing a marketplace online. Alternatively, they may choose to contract out one or more activities, such as the management of their onsite data center or help-desk support, to a computer services firm.

Services provided by this industry include custom computer programming services; computer systems design services; computer facilities management services, including computer systems or data processing facilities support services for clients; and other computer-related services such as disaster recovery services and software installation. Computer training contractors, however, are grouped with educational services, and establishments that manufacture and sell computer equipment are included with electronic equipment manufacturing. Establishments primarily engaged in providing computer data processing services at their own facility for others are classified in the data processing, hosting, and related services industry. Producers of packaged software and Internet-based software are part of the software publishers industry, which is discussed elsewhere in the *Career Guide*. Telecommunications services, including cable Internet providers, also are covered in a separate *Career Guide* statement.

Professional services offered within this industry include custom programming, computer systems design, and other specialized consulting. Custom programming establishments write, modify, test, and support software to meet the needs of a particular customer. These service firms may be hired to code large programs or install a software package on a user's system and customize it to the user's specific needs. Programming service firms also may update or re-engineer existing systems. Systems design services firms plan and design computer systems that in-

tegrate computer hardware, software, and communications technologies. The hardware and software components of the system may be provided by the design firm as part of integrated services or may be provided by third parties or vendors. These firms often install the system and train and support its users.

Computer facilities management services usually are offered at the customer's site. Establishments offering these services provide onsite management and operation of clients' computer systems and data processing facilities, as well as facilities support services.

Electronic business ("e-business") is any process that a business organization conducts over a computer-mediated network. Electronic commerce ("e-commerce") is that part of e-business that involves the buying and selling of goods and services online. With the growth of the Internet and the expansion of electronic commerce, some service firms specialize in developing and maintaining Web sites for client companies. Others create and maintain corporate intranets or self-contained internal networks linking multiple users within an organization by means of Internet technology. These firms design sophisticated computer networks, assist with upgrades or conversions, custom design special programming features for clients and engage in continual maintenance. They help clients select the right hardware and software products for a particular project, and then develop, install, and implement the system, as well as train the client's users. Service firms also offer consulting services for any stages of development throughout the entire process, from design and content development to administration and maintenance of site security.

The widespread use of the Internet and intranets also has resulted in an increased focus on security. The robust growth of electronic commerce highlights this concern, as firms seek to attract as many potential customers as possible to their Web sites. Security threats range from damaging computer viruses to online credit card fraud. Services contracted out to security consulting firms include analyzing vulnerability, managing firewalls, and providing intrusion and antivirus protection. Information technology (IT) security has two important aspects: Computer security, making software and networks safe; and homeland security, keeping track of people and information. The need for more secure Internet and Intranet sites to ensure protection for individuals' personal information, and for companies and

banks to protect their funds and infrastructure, has created a new demand for cyberspace security professionals.

Working Conditions

Most workers in this industry work in clean, quiet offices. Those in facilities management and maintenance may work in computer operations centers. Given the technology available today, however, more work can be done from remote locations using modems, fax machines, e-mail, and especially the Internet. For example, systems analysts may work from home, with their computers linked directly to computers at a financial services firm. Although they often relocate to a customer's place of business while working on a project, programmers and consultants may actually perform work from locations offsite. Even technical support personnel can tap into a customer's computer remotely in order to identify and fix problems.

Only about 6 percent of the workers in computer systems design and related services firms work part time, compared with 16 percent of workers throughout all industries. Many workers in this industry work more than the standard 40-hour workweek—about 1 in 5 work 50 or more hours a week. For many professionals and technical specialists, evening or weekend work is common to meet deadlines or solve problems. Professionals working for large establishments may have less freedom in planning their schedule than do consultants for very small firms, whose work may be more varied.

Those who work with personal computers for extended periods may experience musculoskeletal strain, eye problems, stress, or repetitive motion illnesses, such as carpal tunnel syndrome.

Employment

In 2002, there were about 1.2 million wage and salary jobs, and an additional 116,000 self-employed workers, making the industry one of the largest in the economy. Most self-employed workers are independent consultants.

While the industry has both large and small firms, the average establishment in computer systems design and related services is relatively small; over 78 percent of establishments employed fewer than 5 workers. The majority of jobs, however, are found in establishments that employ 50 or more workers (chart). Many small establishments in the industry are startup firms that hope to capitalize on a market niche.

Relative to the rest of the economy, there are significantly fewer workers 45 years of age and older; this industry's workforce remains younger than most, with large proportions of workers in the 25 to 44 age range (table 1). This reflects the industry's explosive growth in employment since the early 1980s. The huge increase in employment afforded thousands of opportunities to younger workers possessing the newest technological skills.

Occupations in the Industry

Providing a wide array of information services to clients requires a diverse and well-educated workforce. The majority of workers in computer systems design and related services are professional and related workers, such as computer systems analysts, computer engineers, and computer programmers (table 2). This occupational group accounts for 59 percent of the jobs in the industry, reflecting the emphasis on high-level technical skills

More than three-fourths of the establishments in computer systems design and related services employ fewer than 5 workers

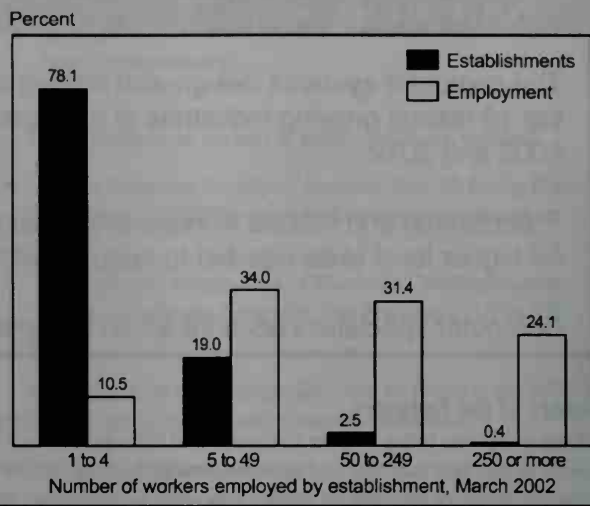


Table 1. Percent distribution of employment in computer systems design and related services by age group, 2002

Age group	Computer systems design and related services	All Industries
Total	100.0%	100.0%
16-19	0.8	4.8
20-24	6.1	9.9
25-34	37.3	21.6
35-44	30.4	26.3
45-54	18.1	22.9
55-64	6.5	11.4
65 and older	0.7	3.2

and creativity. By 2012, the share of professional and related occupations is expected to be even greater, while the share of office and administrative support jobs, currently accounting for 14 percent of industry employment, is projected to fall.

Programmers write, test, and maintain the detailed instructions, called programs or software, that computers must follow to perform their functions. These specialized programs tell the computer what to do—for example, which information to identify and access, how to process it, and what equipment to use. Custom programmers write these commands by breaking down each step into a logical series, converting specifications into a language the computer understands. While some still work with traditional programming languages like COBOL, object-oriented programming languages, such as C++ and Java, computer-aided software engineering (CASE) tools, and artificial intelligence shells now are being used to create and maintain programs. These languages and tools allow portions of code to be reused in programs that require similar routines. Many programmers also customize a package to clients' specific needs or create better packages.

Computer engineers design, develop, test, and evaluate computer hardware and related equipment, software programs, and systems. Although programmers write and support programs in new languages, much of the design and development now is the responsibility of *software engineers* or *software developers*. (See *Career Guide* statement on software publishers.) Software engineers in systems design and related services must possess strong programming skills, but are more concerned with developing algorithms and analyzing and solving programming problems for specific network systems than with actually writing code. *Computer systems software engineers* are primarily engaged in writing, modifying, testing, and developing software to meet the needs of a particular customer. They develop software systems for control and automation in manufacturing, business, and other areas.

Professionals involved in analyzing and solving problems include *systems analysts*, who study business, scientific, or engineering data processing problems and design new flows of information. Computers need to be connected to each other and to a control server to allow communication among users, thus enhancing use of their computing power. Systems analysts tie together hardware and software to give an organization the maximum benefit from its investment in machines, personnel, and business processes. To do this, they may design entirely new systems or add a single new software application to harness more of the computer's power. They use data modeling, structured analysis, information engineering, and other methods. Systems analysts prepare charts for programmers to follow for proper coding and also perform cost-benefit analyses to help management evaluate the system. They ensure that the system performs to its specifications and test it thoroughly.

Database administrators determine ways to organize and store data and work with database management systems software. They set up computer databases and test and coordinate changes to them. Because they also may be responsible for design implementation and system security, database administrators often plan and coordinate security measures.

Computer and information scientists work as theorists, researchers, or inventors. They apply a higher level of theoretical expertise and innovation and develop solutions to complex problems relating to computer hardware and software. Computer and information scientists with advanced backgrounds in security may be employed as cyberspace security specialists in disaster recovery situations or in custom security software installation.

Computer support specialists provide technical assistance, support, and advice to customers and users. This group of occupations includes workers with a variety of titles, such as *technical support specialists* and *help-desk technicians*. These troubleshooters interpret problems, and provide technical support for hardware, software, and systems. Support specialists may work either within a company or other organization or directly for a computer hardware and software vendor. They answer telephone calls, analyze problems using automated diagnostic programs, and resolve recurrent difficulties encountered by users.

Other computer specialists include a wide range of related professionals who specialize in operation, analysis, education, application, or design for a particular piece of the system. Many are involved in the design, testing, and evaluation of network

systems, such as local area networks (LANs), wide area networks (WANs), Internet, and other data communications systems. Specialty occupations reflect an emphasis on client-server applications and end-user support; however, occupational titles shift rapidly to reflect new developments in technology.

Network systems and data communications analysts, for example, design, and evaluate network systems, such as LANs, WANs, and the Internet. They perform network modeling, analysis, and planning and may deal with the interfacing of computer and communications equipment. With the explosive growth of the Internet, this group includes a variety of occupations relating to design, development, and maintenance of Web sites and their servers. *Web developers* are responsible for day-to-day site design and creation. *Webmasters* are responsible for the technical aspects of the Web site, including performance issues such as speed of access, and for approving site content.

Network or computer systems administrators install, configure, and support an organization's LAN, WAN, network segment, or Internet system. They maintain network hardware and software, analyze problems, and monitor the network to ensure availability to system users. Administrators also may plan, coordinate, and implement network security measures. In some organizations, *computer security specialists* are responsible for the organization's information security.

Computer and information systems managers direct the work of systems analysts, computer programmers, and other computer-related workers. They analyze the computer and information needs of their organization and determine personnel and equipment requirements. These managers plan and coordinate activities such as the installation and upgrading of hardware and software; programming and systems design; development of computer networks; and implementation of Internet and intranet sites.

Due, in part, to the robust growth in electronic commerce, a growing number of other workers in this industry is in sales and related occupations. In order to compete successfully and gain customers and clients in the online world, the presentation and features of Web sites and other Web-related content becomes increasingly important. The marketing and sales workers employed in this industry are responsible for promoting and selling the products and services provided by the various sectors of this industry.

Training and Advancement

Occupations in the computer and data processing services industry require varying levels of education. The level of education and type of training required depend on employers' needs. One factor affecting these needs is changes in technology. In the past, there has been strong demand for workers with skills related to the Internet, sending employers scrambling to find workers capable of implementing "hot" new technologies. As the job market for computer specialists has become more competitive, employers have become more selective in the hiring process. Formerly, employers might hire an applicant with less computer-related education or experience in efforts to keep up with the fast growth in this industry. Growth in the numbers of qualified workers, as well as shrinking of the technology job market from its

Table 2. Employment of wage and salary workers in computer systems design and related services by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,163	100.0	54.6
Management, business, and financial occupations	203	17.5	59.3
Chief executives	8	0.7	52.6
General and operations managers	32	2.7	48.4
Marketing and sales managers	16	1.3	74.5
Sales managers	8	0.7	65.5
Computer and information systems managers	35	3.0	68.8
Financial managers	8	0.7	52.6
Engineering managers	7	0.6	52.6
All other managers	7	0.6	52.6
All other business operations specialists	16	1.4	67.9
Management analysts	24	2.1	68.8
Accountants and auditors	9	0.8	51.9
Professional and related occupations	689	59.3	60.6
Computer programmers	124	10.7	33.2
Computer software engineers, applications	121	10.4	69.9
Computer software engineers, systems software	70	6.1	86.9
Computer support specialists	86	7.4	52.6
Computer systems analysts	100	8.6	68.4
Database administrators	15	1.3	74.8
Network and computer systems administrators	40	3.4	68.4
Network systems and data communications analysts	24	2.0	91.4
All other computer specialists	27	2.4	65.9
Computer hardware engineers	10	0.8	52.9
Technical writers	7	0.6	52.6
Sales and related occupations	67	5.8	38.1
Sales representatives, wholesale and manufacturing, technical and scientific products	20	1.7	22.1
All other sales and related workers	18	1.6	52.6
Office and administrative support occupations	165	14.2	33.1
First-line supervisors managers of office and administrative support workers	11	0.9	30.9
Bookkeeping, accounting, and auditing clerks	14	1.2	30.2
Customer service representatives	32	2.8	52.6
Receptionists and information clerks	6	0.5	52.6
Secretaries and administrative assistants	31.0	31	2.7
Computer operators	8	0.7	3.5
Data entry keyers	8	0.7	10.3
Office clerks, general	20	1.7	32.9
Installation, maintenance, and repair occupations	21	1.8	45.6
Computer, automated teller, and office machine repairers	6	0.6	37.4
Telecommunications equipment installers and repairers, except line installers	6	0.5	45.0

NOTE: May not add to totals due to omission of occupations with small employment.

peak in 2000, has made employers more selective, hiring those candidates with more education and more experience. Another factor driving employers' needs is the timeframe within which a project must be completed.

Computer programmers commonly hold a bachelor's degree; however, there are no universal educational requirements. Some hold a degree in computer science, mathematics, or information systems, while others have taken special courses in computer programming to supplement their study in fields such as accounting, inventory control, or other areas of business. Because employers' needs are so varied, a 2-year degree or certificate may be sufficient for some positions, so long as applicants possess the right technical skills.

Most computer systems analysts and computer engineers, on the other hand, usually have a bachelor's or higher degree and work experience. Many hold advanced degrees in technical fields or a master's degree in business administration (MBA) with a concentration in information systems, and are specialists in their fields. For systems analyst, programmer-analyst, or even database administrator positions, many employers seek applicants who have a bachelor's degree in computer science, information science, or management information systems (MIS). For computer and information scientists, a doctoral degree generally is required due to the highly technical nature of their work. For some networks systems and data communication analysts, such as Webmasters, an associate degree or certificate generally is sufficient, although more advanced positions might require a computer-related bachelor's degree.

Persons interested in becoming a computer support specialist generally need only an associate degree in a computer-related field, as well as significant hands-on experience with computers. They also must possess strong problem-solving and analytical skills as well as excellent communication skills, because troubleshooting and helping others are such a vital part of the job. And because there is constant interaction on the job with other computer personnel, customers, or employees, computer support specialists must be able to communicate effectively on paper, via e-mail, or in person. They also must possess strong writing skills when preparing manuals for employees and customers. As technology continues to improve, computer support specialists must constantly strive to stay up to date and acquire new skills if they wish to remain in the field.

Computer and information systems managers usually require a bachelor's degree in a computer-related occupation, combined with work experience. Employers, though, often prefer a graduate degree, especially an MBA with technology as a core component.

The size of the firm and the local demand for workers also may influence training requirements for specific jobs. Smaller firms may be willing to train informally on the job, whereas larger organizations may pay for formal training or higher education. For example, many of the marketing and sales workers are able to secure entry-level jobs with little technical knowledge but quickly learn the technical knowledge necessary for their company and product. With more formal education, employees may advance to completely different jobs within the industry. Education or training in a specialty area may provide new opportunities for the worker and allow the establishment to offer new services.

As technological advances in the computer field continue, employers in all areas demand a higher level of skill and expertise. Employers, hardware and software vendors, colleges and universities, private training institutions, or professional computing societies offer continuing education and professional development seminars. Technical or professional certification is a way by which employers ensure the competency or quality of computer professionals. Certification can be obtained voluntarily, though many vendors now offer or even require professionals who work with their products to be certified.

Voluntary certification is available through organizations such as the Institute of Certification and Computing Professionals (ICCP) and the Institute of Electrical and Electronics Engineers (IEEE) Computer Society. Although professional certification is not mandatory, it may provide a jobseeker a competitive advantage. ICCP offers the Certified Computing Professional (CCP) designation to those who have at least 2 years of experience and a college degree. Candidates must pass a core examination testing general knowledge, plus exams in two specialty areas, or in a specialty area and two computer programming languages. The IEEE Computer Society recently created a certification process for software engineers who pass an examination.

Entry-level computer programmers usually start working with an experienced programmer, updating existing code, generating lines of one portion of a larger program, or writing relatively simple programs. They then advance to more difficult programming and may become project supervisors, or move into higher management positions within the organization. Many programmers who work closely with systems analysts advance to systems analyst positions.

Systems analysts may begin working with experienced analysts or may deal with only small systems or one aspect of a system. They also may move into supervisory positions as they gain further education or work experience. Systems analysts who work with one type of system, or one aspect or application of a system, can become specialty consultants or move into management positions. Computer engineers and scientists who show leadership ability also can become project managers or advance into management positions, such as manager of information systems or chief information officer. Technical support specialists may advance by developing expertise in an area that leads to other opportunities. For example, those responsible for network support may advance into network administration or network security.

Consulting is an attractive option for experienced workers who do not wish to advance to management positions, or who would rather continue to work with hands-on applications or in a particular specialty. These workers may market their services on their own, under contract as specialized consultants, or with an organization that provides consulting services to outside clients. Many of the largest firms today have subsidiaries that offer specialized services to the host company and to outside clients. Large consulting and computer firms often will hire inexperienced college graduates and put them through intensive, company-based programs that train them to provide such services.

Many experienced workers also have opportunities to move into sales positions as they gain knowledge of specific products. The emergence of various forms of electronic commerce has

resulted in efforts by technical workers to make Web sites and content appealing to potential customers, so that they become comfortable conducting transactions over the Internet. Computer programmers who adapt prepackaged software for accounting organizations may use their specialized knowledge to sell such products to similar firms.

Earnings

Employees in the computer systems design and related services industry generally command higher earnings than the national average. All production or nonsupervisory workers in the industry averaged \$1,103 a week in 2002, significantly higher than the average of \$506 for all industries. This reflects the concentration of professionals and specialists who often are highly compensated for their specialized skills or expertise. Given the pace at which technology advances in this industry, earnings can be driven by demand for specific skills or experience. Workers in segments of the industry that offer only professional services have even higher average earnings because there are fewer less skilled, lower paid workers in these segments. Earnings in selected occupations in computer systems design and related services appear in table 3.

As one might expect, education and experience influence earnings as well. For example, annual earnings of computer software engineers ranged from less than \$43,750 for the lowest 10 percent to more than \$113,590 for the highest 10 percent in 2002. Managers usually earn more because they have been on the job longer and are more experienced than their staffs, but their salaries, too, can vary by level and experience. Accordingly, annual earnings of computer and information systems managers ranged from less than \$55,620 for the lowest 10 percent to more than \$145,600 for the highest 10 percent in 2002. Earnings also are affected by other factors, such as size, location, and type of establishment, hours and responsibilities of the employee, and level of sales.

Unionization is rare in the computer systems design and related services industry; fewer than 2 percent of all workers are union members or are covered by union contracts, compared with 15 percent of workers throughout private industry.

Outlook

The computer systems design and related services industry grew dramatically throughout the 1990s, as employment more than doubled. And despite recent job losses in certain sectors, this remains one of the 10 fastest growing industries in the Nation. Wage and salary employment is expected to grow 55 percent by the year 2012, compared with only 16 percent growth projected for the entire economy. Given the rate at which the computer systems design and related services industry is expected to grow and the increasing complexity of technology available, job opportunities will be extremely favorable for most workers. The best opportunities will be for professional and related occupations, reflecting their growth and the continuing demand for higher level skills to keep up with changes in technology.

An increasing reliance on information technology, combined with falling prices of computers and related hardware, means that individuals and organizations will continue to turn to computer systems design and related services firms to maximize the

Table 3. Median hourly earnings of the largest occupations in computer systems design and related services, 2002

Occupation	Computer systems design and related services	All industries
General and operations managers	\$53.64	\$32.80
Computer and information systems managers	45.31	40.98
Computer software engineers, systems software	35.32	35.60
Computer software engineers, applications	34.56	34.09
Computer systems analysts	32.54	30.24
Management analysts	31.79	29.01
Computer programmers	31.56	28.98
Network and computer systems administrators	28.27	26.35
Computer support specialists	19.76	18.80
Customer service representatives	14.01	12.62

return on their investments in equipment and to fulfill their growing computing needs. Such needs include the expansion of electronic commerce, a growing reliance on the Internet, faster and more efficient internal and external communication, and the implementation of new technologies and applications. With increasing global competition and rising costs, organizations must be able to obtain and manage the latest information in order to make business decisions. At the same time, employment growth may be tempered somewhat by an increase in contracting out more routine services abroad, where labor costs are lower, as companies strive to remain competitive. For example, firms have been able to cut costs by shifting more support services operations abroad to countries with highly educated workers who have strong technical skills. However, the trend towards contracting out work will adversely affect employment of only certain types of workers, such as programmers and computer support specialists, because much of the work integrating and designing systems needs to be done onsite.

Within the computer systems design and related services industry, projected growth varies by sector. The demand for networking and the need to integrate new hardware, software, and communications technologies will drive the demand for consulting and integration. A need for more customized applications development and support and services to assist users will drive demand for applications development and facilities support services. And, as more individuals and organizations are conducting business electronically, the importance of maintaining system and network security will increase. Recent events have made society more conscious of the vulnerability of technology and the Internet. The increasing need for security related to information technology will expand employment opportunities for individuals involved in cyberspace security services such as disaster recovery services, custom security programming, and security software installation services.

This increased need for security will help to create more jobs in the computer systems design and related services industry. Security specialists will be employed more often to make judg-

ments on a system's vulnerability. Custom programmers and designers will be asked to help develop new antivirus software, programs, and procedures as preemptive measures to keep "hackers" out and systems virus-free. Therefore, employment of security analysts and consultants with security experience and expertise should rise rapidly.

New growth areas will continue to arise from rapidly evolving technologies and business forces. The expansion of the Internet, the proliferation of Web sites, and "mobile" technology such as wireless Internet have created a demand for a wide variety of new products and services, including online services, network design services, and a range of specialized consulting. For example, the expansion of the wireless Internet, known as WiFi, brings a new aspect of mobility to information technology. This new technology will allow people to stay connected anywhere anytime, in restaurants, shops, hotels, and even on airplanes. As individuals and businesses rely more on more compact, handheld computers and wireless Internet connections, it will be necessary to integrate the current computer systems with this more mobile new technology. The expansion of this technology in the next 10 years will lead to an increased need for "mobility consultants" or service firms that can help companies design and integrate computer systems so that they will be compatible with one another.

The way the Internet is used is constantly changing, along with the products, services, and personnel required to support new applications. Expanding electronic commerce changed the way companies transact business, enabling markets to expand and an increasing array of services to be provided to customers. And, as the amount of computer-stored information grows, organizations will continue to look for ways to tap the full potential of their vast stores of data. Demand for an even wider array of services should increase as companies continue to expand their capabilities, integrate new technologies, and develop new applications. As there are more innovations and new technology is released, there will be a steady need for computer systems facilities support services to provide assistance to the users.

Given the increasingly widespread use of information technologies and the overall rate of growth expected for the entire industry, most occupations should continue to grow rapidly, although some will do so faster than others. As firms continue to install sophisticated computer networks, set up Internet and intranet sites, and engage in electronic commerce, the most rapid growth will occur among computer specialists such as systems analysts, network and computer systems administrators, computer support specialists, and computer and information systems managers. Employment of programmers should continue to expand, but more slowly than that of other occupations, as the proportion of programmers decreases in relation to other computer specialists.

Sources of Additional Information

Information regarding certification of computer professionals is available from:

- Institute for Certification of Computing Professionals ,
2350 E. Devon Ave. , Suite 115, Des Plaines, IL 60018.
Internet: <http://www.iccp.org>

Further information about computer careers is available from:

- Association for Computing Machinery, 1515 Broadway, New York, NY 10036.
Internet: <http://www.acm.org>
- IEEE Computer Society, Headquarters Office, 1730 Massachusetts Ave. NW., Washington, DC 20036-1992.
Internet: <http://www.computer.org/certification>
- National Workforce Center for Emerging Technologies, 3000 Landerholm Circle SE., Bellevue, WA 98007.
Internet: <http://www.nwecet.org>

Information on the following occupations can be found in the 2004-05 *Occupational Outlook Handbook*:

- Computer and information systems managers
- Computer operators
- Computer programmers
- Computer software engineers
- Computer support specialists and systems administrators
- Computer systems analysts, database administrators, and computer scientists

Employment Services

(NAICS 5613)

SIGNIFICANT POINTS

- Employment services ranks among the industries projected to grow the fastest and to provide the most new jobs.
- Most temporary jobs in this industry require only graduation from high school, while some permanent jobs may require a bachelor's or higher degree.
- Temporary jobs provide an entry into the workforce, supplemental income, and a bridge to full-time employment for many workers.

Nature of the Industry

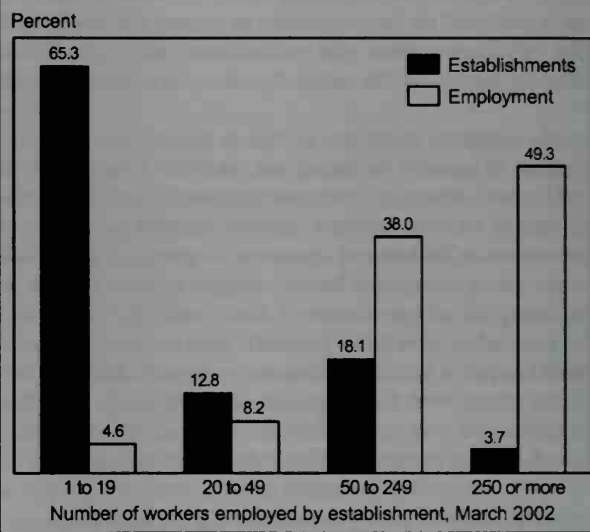
Although many people associate the employment services industry with temporary employment opportunities for clerical workers, the industry matches millions of people with jobs, providing both temporary and permanent employment to individuals with a wide variety of education and managerial and professional work experience. Occupations in the industry range from secretary to computer systems analyst, and from general laborer to nurse. In addition to temporary jobs in these occupations, permanent positions in the industry include workers such as employment interviewers and marketing representatives who help assign and place workers in jobs. Nearly half of all jobs in employment services are at large establishments with 250 or more workers (see chart).

The employment services industry has three distinct segments. *Employment placement agencies* list employment vacancies and place permanent employees. *Temporary help services*, also referred to as temporary staffing agencies, provide employees to other organizations, on a contract basis and for a limited period, to supplement the workforce of the client. *Professional employer organizations* are engaged in providing human resources and human resources management services to staff client businesses. They also assign workers to client locations, thereby assuming responsibility as an employer while providing a cost-effective approach to the management and administration of the human resources functions of its clients on a contract basis.

The typical employment placement agency has a relatively small permanent staff, usually fewer than 10 workers, who interview jobseekers and try to match their qualifications and skills to those being sought by employers for specific job openings.

In contrast to the smaller employment agencies, temporary help agencies typically employ many more workers. Temporary help services firms provide temporary employees to other businesses to support or supplement their workforce in special situations, such as employee absences, temporary skill shortages, and varying seasonal workloads. Temporary workers are employed and paid by the temporary help services firm but are contracted out to a client for either a prearranged fee or an agreed hourly wage. Some companies choose to use temporary workers full time on an ongoing basis, rather than employ permanent staff, who typically would receive greater salaries and benefits. As a

Nearly half of all jobs in employment services are at large establishments with 250 or more workers



result, the overwhelming majority of workers in the temporary help services segment of the employment services industry are temporaries; relatively few are permanent staff.

Professional employer organizations specialize in performing a wide range of human resource and personnel management duties for their client businesses, including payroll processing, accounting, benefits administration, recruiting, and handling labor relations. Employee leasing establishments, which are a type of professional employer organization, typically acquire and lease back some or all of the employees of their clients and serve as the employer of the leased employees for payroll, benefits, and related purposes.

Traditionally, firms that placed permanent employees usually dealt with highly skilled applicants, such as lawyers or accountants, and those placing temporary employees dealt with less skilled workers, such as administrative support occupations. However, temporary help services firms increasingly place workers who have a range of educational backgrounds and work experience because businesses now are turning to temporary em-

employees to fill all types of positions—from administrative to managerial, financial, professional, and production.

Working Conditions

The average annual work week in the employment services industry was about 32.6 hours in 2002, compared with the average of 33.9 hours across all industries. The low average work week reflects the fact that a temporary employee could work 40 or more hours a week on a contract for an extended period and then take a few weeks off from work. Most full-time temporary workers put in 35 to 40 hours a week, while some work longer hours. Permanent employees in employment agencies usually work a standard 40-hour week, unless seasonal fluctuations require more or fewer hours.

Workers employed as permanent staff of employment agencies, temporary help services firms, or professional employer organizations usually work in offices and may meet numerous people daily. Temporaries work in a variety of environments and often do not stay in any one place long enough to settle into a personal workspace or establish close relationships with coworkers. Most assignments are of short duration because temporaries may be called to replace a worker who is ill or on vacation or to help with a short-term surge of work. However, assignments of several weeks or longer occasionally may be offered. On each assignment, temporary employees may work for a new supervisor.

Employment as a temporary is attractive to many. The opportunity for a short-term source of income while enjoying flexible schedules and an ability to take extended leaves of absence is well-suited to students, persons juggling job and family responsibilities, those exploring various careers, and those seeking permanent positions in a chosen career. Firms try to accommodate workers' preferences for particular days or hours of work and for frequency or duration of assignments. Temporary work assignments provide an opportunity to experience a variety of work settings and employers, to sharpen skills through practice, and to learn new skills. Nevertheless, many workers in temporary assignments would prefer the stability and greater benefits associated with full-time work.

The annual injury and illness rate for the employment services industry as a whole was 3.6 cases for every 100 full-time workers in 2002, lower than the rate of 5.3 for the entire private sector. Temporary workers in industrial occupations often perform work that is more strenuous and potentially more dangerous, so they may have a higher rate of injury and illness.

Employment

The employment services industry provided 3.2 million jobs in 2002, about 2.2 million of them in temporary help services firms. Professional employer organizations employed 790,000 and employment placement agencies employed another 281,000. Although about 36,000 of the 62,000 establishments in the industry are temporary help services firms, they employ 2 out of 3 industry workers.

Employment in the employment services industry is distributed throughout the United States. Workers are somewhat younger than those in other industries—44 percent of employment services workers are under 35, compared with 36 percent

of all workers, reflecting the large number of clerical and other entry-level positions in the industry that require little formal education.

Occupations in the Industry

The employment services industry encompasses many fields, from office and administrative support occupations to professional and production occupations (table 1). In general, occupations in the industry include the permanent staff of employment services firms, and the variety of occupations supplied through the temporary help services segment of the industry and the professional employer organizations.

The staff of employment service agencies is responsible for the daily operation of the firm. Many of these workers are in management, business, and financial, and sales occupations, which together account for only about 7 percent of jobs in this industry. *Managers* ensure that the agency is run effectively, and they often conduct interviews of potential clients and jobseekers. *Employment, recruitment, and placement specialists* recruit and evaluate applicants and attempt to match them with client firms. Most work in the personnel supply services industry. *Sales workers* actively pursue new client firms and recruit qualified workers. Because of fierce competition among agencies, marketing and sales work at times can be quite stressful.

About 3 in 10 workers in this industry are in office and administrative support jobs. These positions may be either temporary or permanent. Experience in office and administrative support occupations usually is preferred for these jobs, although some persons take special training to learn skills such as bookkeeping and word processing. *Receptionists* greet visitors, field telephone calls, and perform assorted office functions. *Secretaries* perform a growing range of tasks, such as keyboarding and answering the telephone, depending on the type of firm in which they work. *Medical secretaries* make appointments and need a familiarity with common medical terms and procedures; *legal secretaries* must be familiar with the format of common legal documents. *General office clerks* file documents, type reports, and enter computer data. *File clerks* classify and store office information and records. *Data entry keyers* type information into a computer data base, either through a personal computer or directly into a mainframe computer. *Word processors and typists* enter and format drafts of documents using typewriters or computers. *Bookkeeping clerks* compute, classify, and record transaction data for financial records and reports.

Production occupations and transportation and material moving occupations together account for 40 percent of employment in the employment services industry. Many of these jobs seldom require education beyond high school, although related work experience may be preferred for some. Others require significant experience and on-the-job training. Highly skilled *assemblers and fabricators* may assemble and connect parts of electronic devices, while those who are less skilled work on production lines, continually repeating the same operation. *Helpers* perform a variety of mostly unskilled tasks. *Laborers and freight, stock, and material movers* transport goods to and from storage areas in either factories, warehouses, or other businesses. *Hand packers and packagers* wrap, package, inspect, and label mate-

rials manually, often keeping records of what has been packed and shipped.

A growing number of temporary workers are specialized professional and related workers, who currently account for another 9 percent of employment. Professional and related occupations include a variety of specialists and practitioners, some of whom require many years of postsecondary education to qualify for their positions. For example, *lawyers or attorneys* generally need 4 years of college and 3 years of law school. They act as advisors, providing counsel on legal rights and obligations and suggesting particular courses of action in business. Computer programmers write, test, and maintain the detailed instructions, called programs or software that computers must follow to perform their functions. Other computer specialists include computer support specialists, who provide technical assistance, support, and advice to customers and users. Licensed practical nurses provide basic bedside care to patients. Registered nurses administer medication, tend to patients, and advise patients and family members about procedures and proper care. They usually work in hospitals, but they may be assigned to private duty in patients' homes.

Service workers employed on a temporary basis also include a number of healthcare support occupations. *Home health aides* usually work in the home of an elderly or ill patient, allowing the patient to stay at home instead of being institutionalized. Becoming a home health aide generally does not require education beyond high school. *Nursing aides* and *orderlies* also seldom need education beyond high school, but employers do prefer previous experience. These workers assist nurses with patient care in hospitals and nursing homes.

The remainder of the workers in this industry includes those in farming, fishing, and forestry and installation, maintenance, and repair occupations.

Training and Advancement

The employment services industry offers opportunities in many occupations for workers with a variety of skill levels and experience. The majority of temporary jobs still require only graduation from high school or the equivalent, while some permanent jobs, such as those in management, may require a bachelor's or higher degree. In general, the training requirements of temporary workers mirror those for permanent employees in the economy as a whole. As the industry expands to include various professional and managerial occupations, therefore, a growing number of jobs will require professional or advanced degrees.

Many temporary help services firms offer skills training to newly hired employees to make them more marketable. This training often is provided free to the temporary worker and is an economical way to acquire training in important skills such as word processing. Agency training policies vary, so persons considering temporary work should ask firms what training they offer and at what cost.

Advancement as a temporary employee usually takes the form of pay increases or greater choice of jobs. More often, temporaries transfer to full-time jobs with other employers. Turnover among temporaries within help supply firms usually is very high because few choose to work as temporaries for long; many accept offers to work full time for clients for whom they worked as

Table 1. Employment of wage and salary workers in employment services by occupation, 2002 and projected change, 2002-2012.
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-2012
	Number	Percent	
All occupations	3,249	100.0	54.3
Management, business, and financial occupations	136	4.2	73.1
Human resources, training, and labor relations specialists	44	1.3	65.5
Professional and related occupations	294	9.0	66.1
Computer specialists	51	1.6	75.2
Architecture and engineering occupations	49	1.5	71.1
Registered nurses	64	2.0	55.9
Licensed practical and licensed vocational nurses	35	1.1	59.3
Service occupations	260	8.0	65.7
Nursing aides, orderlies, and attendants	46	1.4	59.3
Food preparation and serving related occupations	64	2.0	53.4
Janitors and cleaners, except maids and housekeeping cleaners	40	1.2	75.5
Sales and related occupations	92	2.8	63.6
Office and administrative support occupations	924	28.4	47.8
Bookkeeping, accounting, and auditing clerks	45	1.4	43.4
Customer service representatives	71	2.2	75.5
File clerks	33	1.0	27.5
Receptionists and information clerks	67	2.1	75.5
Stock clerks and order fillers	45	1.4	34.8
Executive secretaries and administrative assistants	64	2.0	50.9
Secretaries, except legal, medical, and executive	79	2.4	34.1
Data entry keyers	70	2.2	2.4
Office clerks, general	198	6.1	68.1
Construction and extraction occupations	161	4.9	74.4
Construction trades and related workers	107	3.3	77.4
Installation, maintenance, and repair occupations	42	1.3	73.4
Production occupations	595	18.3	53.0
Assemblers and fabricators	144	4.4	40.5
Metal workers and plastic workers	85	2.6	61.3
Packaging and filling machine operators and tenders	71	2.2	75.5
Helpers—Production workers	99	3.1	40.4
Transportation and material moving occupations	728	22.4	44.1
Driver/sales workers and truck drivers	57	1.8	59.2
Laborers and freight, stock, and material movers, hand	446	13.7	36.1
Packers and packagers, hand	146	4.5	55.9

NOTE: May not add to totals due to omission of occupations with small employment.

temporaries. Some experienced temporaries may be offered permanent jobs with help firms, either as receptionists or in positions screening or training others for temporary jobs.

Staff of employment placement agencies and permanent staff of temporary help services firms typically are employment interviewers, administrative support workers, or managers. The qualifications required of employment interviewers depend partly on the occupations that the employment placement agency or temporary help services firm specializes in placing. For example, agencies that place professionals, such as accountants or nurses, usually employ interviewers with college degrees in similar fields. Agencies specializing in placing administrative support workers, such as secretaries or word processors, are more likely to hire interviewers with less education, but who have experience in those occupations. Staff of professional employer organizations include professionals in human resources management, payroll, risk management, legal services, financial management, employment compliance, and administration.

Although administrative support occupations, such as receptionists, usually do not require formal education beyond high school, related work experience may be needed. Sometimes, staff experienced in administrative support occupations advance to employment interviewer positions. Most managers have college degrees; an undergraduate degree in personnel management or a related field is the best preparation for these jobs. Employment, recruitment, and placement specialists often advance to managerial positions, but seldom without a bachelor's degree.

Earnings

In 2003, earnings among nonsupervisory workers in employment services firms were \$13.04 per hour and \$425 per week, lower than the \$14.95 an hour and \$506 a week for all private industry.

Earnings vary as widely as the range of skills and formal education among workers in employment services. As in other industries, managers and professionals earn more than clerks and laborers. Also, temporaries usually earn less than workers employed as permanent staff, but some experienced temporaries make as much as or more than workers in similar occupations in other industries. Earnings in the largest occupations in employment services appear in table 2.

Table 2. Median hourly earnings of the largest occupations in employment services, 2002

Occupation	Employment services	All industries
Registered nurses	\$26.91	\$23.12
Secretaries, except legal, medical, and executive	11.70	12.16
Customer service representatives	10.82	12.62
Data entry keyers	10.17	10.77
Receptionists and information clerks	10.05	10.17
Office clerks, general	9.92	10.71
Packaging and filling machine operators and tenders	7.93	10.20
Laborers and freight, stock, and material movers, hand	7.90	9.48
Helpers—production workers	7.79	9.25
Packers and packagers, hand	7.65	8.03

Most permanent workers receive basic benefits; temporary workers usually do not receive such benefits unless they work a minimum number of hours or days per week to qualify for benefit plans. Less than 3 percent of workers in employment services are union members or are covered by union contracts, compared with about 15 percent of workers in all industries combined.

Outlook

Employment services ranks among the fastest growing industries in the Nation and is expected to be among those that provide the most new jobs. The industry is expected to gain about 1.8 million new jobs over the 2002-12 projection period. Wage and salary employment in the employment services industry is expected to grow 54 percent over this period, more than 3 times the 16-percent growth projected for all industries combined.

Growth in demand for temporary employees fueled the expansion of the industry throughout the 1990s and is attributable to a number of factors. As competition increased, businesses sought new ways to make their staffing patterns more responsive to changes in demand. To achieve this, they hired temporary employees with specialized skills to reduce costs and to provide the necessary knowledge or experience in certain types of work. Despite recent industry job losses, increasing demand for flexible work arrangements and schedules, coupled with significant turnover in these positions, should create plentiful job opportunities for persons who seek jobs as temporaries or contract workers through 2012. In particular, suppliers of medical personnel to hospitals and other medical facilities should continue to fare well, as demand for temporary healthcare staffing grows to meet the needs of aging baby boomers and to supplement demand for more healthcare services throughout the country.

Employment in professional employer organizations also grew rapidly during the 1990s in response to demands by businesses for changes in human resources management. The increasing complexity of employee-related laws and regulations and a desire to control costs, reduce risks, and provide more integrated services spurred more businesses to contract with professional employer organizations to handle their personnel management, health benefits, workers' compensation claims, payroll, tax compliance, and unemployment insurance claims. This trend is expected to continue as businesses enter into relationships with professional employer organizations and shift these responsibilities to specialists.

Employment placement agencies are expected to continue growing, but not as fast as temporary help services or professional employer organizations. Growth in these agencies stems from employers' increasing willingness to allow outside agencies to perform the preliminary screening of candidates and the growing acceptance of executive recruitment services. However, online employment placement agencies operate without employment counselors and need fewer administrative support workers. Job postings on employer Web sites; online newspaper classified ads; and job matching Internet sites operated by educational institutions and professional associations compete with this industry, thereby dampening employment growth.

Most new jobs will arise in the largest occupational groups in this industry—office and administrative support occupations,

production, and transportation and material moving occupations. However, the continuing trend toward specialization also will spur growth among professional workers, including engineers, computer specialists, and healthcare practitioners such as nurses. Managers also will see an increase in new jobs, as government increasingly contracts out management functions. In addition, growth of temporary help firms and professional employer organizations—which provide human resource management, risk management, accounting, and information technology services—will provide more opportunities for professional workers within those fields. Marketing and sales representative jobs in temporary staffing firms also are expected to increase along with competition among these firms for the most qualified workers and the best clients.

Sources of Additional Information

For information concerning employment in temporary help services, contact:

- American Staffing Association, 277 S. Washington St., Suite 200, Alexandria, VA 22314. Internet: <http://www.staffingtoday.net>

For information about employment placement agencies, contact:

- National Association of Personnel Services, 10905 Ft. Washington Rd., Suite 400, Ft. Washington, MD 20744. Internet: <http://www.napsweb.org>

For information about employer organizations, contact:

- National Association of Professional Employer Organizations, 901 N. Pitt St., Suite 150, Alexandria, VA 22314. Internet: <http://www.napeo.org>

More information about many occupations in this industry, including the following, appears in the 2004-05 *Occupational Outlook Handbook*:

- Construction laborers
- Human resources, training, and labor relations managers and specialists
- Interviewers
- Office and administrative support worker supervisors and managers
- Office clerks, general
- Personal and home care aides
- Receptionists and information clerks
- Secretaries and administrative assistants

Management, Scientific, and Technical Consulting Services

(NAICS 5416)

SIGNIFICANT POINTS

- Although this industry ranks among the fastest growing through the year 2012, job competition should remain keen.
- Nearly one-quarter of all workers are self-employed.
- Seventy-two percent of workers have a bachelor's degree or higher; 57 percent of all jobs are in managerial, business, financial, and professional occupations.
- This industry is one of the highest paying.

Nature of the Industry

Management, scientific, and technical consulting firms influence how businesses, governments, and institutions make decisions. Often working behind the scenes, these firms offer resources that clients cannot provide themselves. Usually, one of the resources is expertise—in the form of knowledge, experience, special skills, or creativity; another resource is time or personnel that the client cannot spare. Clients include large and small companies in the private sector; Federal, State, and local government agencies; institutions, such as hospitals, universities, unions, and nonprofit organizations; and foreign governments or businesses.

The management, scientific, and technical consulting services industry is diverse. Almost anyone with expertise in a given area can enter consulting. Management consulting firms advise on almost every aspect of corporate operations, including marketing; finance; corporate strategy and organization; manufacturing processes; information systems and data processing; electronic commerce (e-commerce) or business; and human resources, benefits, and compensation. Scientific and technical consulting firms provide technical advice relating to almost all nonmanagement organizational activities, including compliance with environmental and workplace safety regulations, the application of technology, and knowledge of sciences such as biology, chemistry, and physics.

Larger consulting firms usually provide expertise in a variety of areas, whereas smaller consulting firms generally specialize in one area of consulting. *Administrative management and general management consulting services* firms, for example, offer advice on an organization's day-to-day operations, such as budgeting, asset management, strategic and financial planning, records management, and tax strategy. A manufacturing firm building a new factory might seek the help of consultants to determine in which geographic location it would incur the lowest startup costs. A family opening a new restaurant might hire a consulting firm to help develop a business plan and provide tax advice. Consulting firms also might advise clients in the implementation and use of the latest office technology or computer programs that could increase office productivity. (For informa-

tion on consulting firms that are engaged primarily in developing computer systems and computer software, see the statements on computer systems design and related services, and software publishing, elsewhere in the *Career Guide to Industries*.) Some clients might turn to consulting firms to manage the financial aspects of their business. Consultants may provide insight into why a division of the company is not profitable or may recommend an investment strategy that meets the client's needs. (For information on firms that engage in buying and selling financial assets, see the statement on securities, commodities, and other investments, elsewhere in the *Career Guide to Industries*.)

Effective management of a client's human capital is the primary work of consulting firms that offer *human resources consulting services*. Firms that focus on this area advise clients on effective personnel policies, employee salaries and benefits, employee recruitment and training, and employee assessment. A client with high employee turnover might seek the help of a consulting firm in improving its retention rate. Consulting firms might also be asked to help determine the appropriate level of employer and employee contributions to health-care and retirement plans. Increasingly, firms are outsourcing, or contracting out, the administrative functions of their human resources division to human resources consulting firms that manage timekeeping and payroll systems and administer employee benefits.

One human resources consulting specialty is *executive search consulting* or *executive recruiting*. Firms in this industry are typically referred to as "headhunters." Executive search consulting firms are involved in locating the best candidates for top-level management and executive positions. Clients hire executive recruiters in order to save time and preserve confidentiality. Executive search firms keep a large database of executives' resumes and search this database for clients in order to identify candidates who would likely complement the client's corporate culture and strategic plan. Information on these candidates is then submitted to the clients for their selection. Executive search consulting firms also might conduct prescreening interviews and reference and background checks. Some executive search consulting firms specialize in recruiting for a particular industry or

geographic area, while others conduct general searches. (For information on firms that provide employment services to jobseekers at all employment levels, see the statement on employment services, elsewhere in the *Career Guide to Industries*.)

Marketing consulting services firms provide assistance to firms in areas such as developing new products and pricing, forecasting sales, planning and implementing a marketing strategy, and improving customer service. A pharmaceutical firm, for example, might seek advice as to whether it should remove a drug from the market, or a retail clothing chain might seek advice regarding the most effective way to market and sell its clothes—in a direct-mail or online catalog or over the telephone. Clients also might seek the help of a marketing consultant to set up business franchises or license their products.

Another specialty within management consulting is *process, physical distribution, and logistics consulting services*. Firms in this industry specialize in the production and distribution of goods, from the first stages of securing suppliers to the delivery of finished goods to consumers. Such firms give advice on improvements in the manufacturing process and productivity, product quality control, inventory management, packaging, order processing, the transportation of goods, and materials management and handling. A domestic manufacturing firm might hire a logistics consulting firm to calculate shipping rates and import duties for goods being exported or to determine the most cost-effective method of shipping products. Consulting firms in this industry also advise on the latest technology that links suppliers, producers, and customers together to streamline the manufacturing process. Finally, firms in the industry might suggest improvements to the manufacturing process in order to utilize inputs better, increase productivity, or decrease the amount of excess inventory.

While some management consulting firms specialize in a particular business process, others provide a range of business services specific to one industry, such as health care. Many professionals—for example, doctors—lack the business expertise to manage their practice effectively. Consultants advise these clients regarding the same management issues as they do other businesses, such as staff recruitment, compensation and benefits, asset management, marketing, and other business operations. Some consultants offer advice on matters pertaining directly to the industry in question—for instance, for the healthcare industry, compliance with biohazard removal and patient confidentiality regulations, avoidance of malpractice suits, and methods of dealing with managed care and health insurance companies. Industries such as legal services, telecommunication, and utilities also have consulting firms that specialize in specific issues.

Scientific and technical consulting services firms provide services similar to those offered by management consulting firms, but the information is not management related. One of the largest specialties in scientific and technical consulting services is *environmental consulting services*. Environmental consulting firms identify and evaluate environmental problems, such as inspecting sites for water contaminants, and offer solutions. Some firms in the industry advise clients about controlling the emissions of environmental pollutants, cleaning up contaminated sites, establishing a recycling program, and complying with government environmental laws and regulations. A real estate developer, for example, might hire an environmental consulting firm

to help design and develop property without damaging natural habitats, such as wetlands. A manufacturing or utilities firm might hire environmental consultants to assess whether the firm is meeting government emissions standards, in order to avoid penalties before government regulators inspect the property in question. Finally, many government agencies contract work out to environmental consulting firms to assess environmental contamination in a particular geographic area or to evaluate the costs and benefits of new regulations.

Safety consulting services firms provide services similar to those offered by government agencies and private businesses, identifying workplace safety hazards and ensuring that employers are in compliance with government worker safety regulations. Safety consulting firms might identify hazardous materials that may cause illness or injury, assess safety risks associated with machinery, investigate accidents, and assess the likelihood of lawsuits resulting from safety code violations. Some might specialize in a particular type of hazardous material, while other consultants might specialize in a particular industry's safety, such as that of construction, mining, or food processing. As with environmental consulting firms, many government agencies contract work out to safety consulting firms for help with safety engineering, technical projects, and various kinds of assessment.

Security consulting, by contrast, seeks to ensure the safety and security of an organization's physical and human assets that may be threatened by natural or humanmade disasters. Clients might hire security consulting firms to assess a building's security needs. The firms may then protect the building against theft and vandalism by installing security cameras, hiring security guards, and providing employee background checks. Other security consultants study a building's design and recommend measures to protect it from damage from fires, tornadoes, floods, earthquakes, or acts of terrorism. Security consultants might also recommend emergency evacuation procedures in the event that these disasters occur. Increasingly, clients are hiring security consulting firms to protect their confidential computer records against hackers and viruses. Most recently, government agencies have hired security consulting firms to advise them on how to protect national monuments and the national transportation, utility, and defense infrastructure—airports, bridges, nuclear reactor plants, water treatment plants, and military barracks—against terrorism.

Scientific and technical consulting firms also advise on a diverse range of issues relating to the physical and social sciences—issues having to do with agriculture, biology, chemistry, economics, energy, and physics. Agricultural consulting firms might advise on different farming techniques or machinery that increases agricultural production. Economic consultants might develop forecasting models and advise clients about the potential for a recession or an increase in interest rates that could affect business decisions. Energy consultants might advise clients on how to reduce costs by implementing energy-saving machinery. Finally, biological, chemical, and physics consultants might give theoretical or applied expertise in their chosen field.

Management, scientific, and technical consulting has grown rapidly over the past several decades, with businesses increasingly using consulting services. Using consultants is advantageous because these experts are experienced, are well trained,

and keep abreast of the latest technologies, government regulations, and management and production techniques. In addition, consultants are cost effective, because they can be hired temporarily and can perform their duties objectively, free of the influence of company politics.

The vast majority of firms in the management, scientific, and technical consulting industry are small, primarily because new firms can enter the industry quite easily. Licensing, certification, and large capital outlays seldom are necessary for an individual to become a consultant, and the work can be quite lucrative for those with the right education, experience, and contacts. As a result, many wage and salary workers in management, scientific, and technical consulting services eventually leave established firms to go into business for themselves. In addition, after developing specialized expertise, people working in other industries often start their own consulting businesses, and some experienced workers perform consulting work after retiring.

Working Conditions

Working conditions in management, scientific, and technical consulting services are generally similar to those of most office workers operating in a team environment. The work is rarely hazardous, except for workers in a few types of firm performing certain types of jobs—for example, environmental or safety consultants who inspect sites for contamination from hazardous materials. In 2002, the industry had only 1.7 injuries and illnesses per 100 full-time workers, compared with an average of 5.3 throughout private industry.

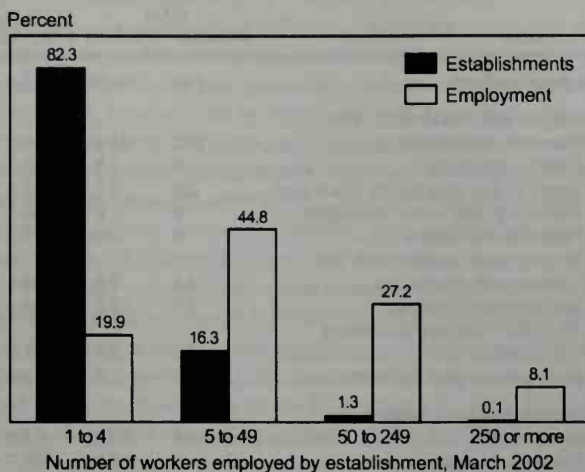
Not all employees in this industry work under identical conditions. In 2002, workers in the industry averaged 35.3 hours per week, a little above the national average of 33.9. However, most consultants who frequently must meet hurried deadlines work long hours in stressful environments. Consultants whose services are billed hourly often are under pressure to manage their time very carefully. Occasionally, weekend work also is necessary, depending upon the job that is being performed. In addition, some projects might require many executives and consultants to travel extensively or live away from home for extended periods. However, new technology, such as laptop computers with remote access to the firm's computer server and videoconferencing machines, allow some consultants to work from home or conduct meetings with clients in different locations, reducing some of the need for business travel.

Most firms encourage employees to attend employer-paid time-management classes. The classes teach participants to reduce the stress sometimes associated with working under strict time constraints. Also, with today's hectic lifestyle, many firms in this industry offer or provide health facilities or clubs that employees may use to maintain good health.

Employment

The management, scientific, and technical consulting services industry had about 732,000 wage and salary workers in 2002; an additional 241,000 workers were self-employed. The largest segment of the industry is administrative management and general management consulting services, which employed 38 percent of workers in the industry in 2002. Human resources and executive search consulting services made up the second largest

More than 98 percent of the establishments in management, scientific, and technical consulting services employ fewer than 50 workers, and they have nearly 65 percent of the industry's jobs



employer with 14 percent of workers, followed by marketing consulting, and process, physical distribution, and logistics consulting services. Environmental consulting services was the largest scientific and technical type of consulting and employed about 8 percent of workers.

The vast majority of establishments in the industry were fairly small, employing fewer than 5 workers (see chart). Self-employed individuals operated many of these small firms. Despite the prevalence of small firms and self-employed workers, large firms tend to dominate the industry. Approximately 35.3 percent of jobs are found in only about 1.4 percent of the establishments, and some of the largest firms in the industry employ several thousand people.

Although employees in this industry work in all parts of the country, many workers are concentrated near large urban centers.

Occupations in the Industry

Most management, scientific, and technical consulting services are fairly specialized; still, the industry comprises a variety of occupations (table 1). Some of these occupations, such as *environmental engineers*, are specific to only one segment of the industry, whereas others, such as *secretaries* and *administrative assistants*, can be found throughout the industry.

Compared with other industries, the management, scientific, and technical consulting services industry has a relatively high proportion of highly educated workers. About 43 percent have a bachelor's degree, compared with 19 percent of the workers throughout the entire economy. Nearly 30 percent have a master's degree or higher, compared with 9 percent of the workers throughout the economy. Certain jobs may have stringent entry requirements. For example, some management consulting firms prefer to hire only workers who have a master's degree in business administration (MBA). Other positions can be attained only after many years of related experience.

Table 1. Employment of wage and salary workers in management, scientific, and technical consulting services by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	732	100.0	55.4
Management, business, and financial occupations	252	34.4	68.2
Chief executives	9	1.3	57.0
General and operations managers	29	4.0	52.6
Marketing and sales managers	9	1.6	63.5
Financial managers	6	0.9	57.0
Employment, recruitment, and placement specialists	13	1.8	45.6
Management analysts	89	12.2	88.4
All other business operations specialists	20	2.7	74.0
Accountants and auditors	13	1.8	25.0
Professional and related occupations	166	22.7	61.8
Computer programmers	9	1.2	37.7
Computer software engineers, applications	8	1.1	75.7
Computer support specialists	7	1.0	57.0
Computer systems analysts	9	1.2	74.1
Environmental engineers	5	0.7	89.8
Engineering technicians, except drafters	5	0.6	63.5
Environmental scientists and specialists, including health	8	1.1	71.9
Market research analysts	9	1.2	58.5
Service occupations	18	2.4	48.9
Sales and related occupations	52	7.1	47.9
Telemarketers	12	1.7	17.3
All other sales and related workers	18	2.4	57.0
Office and administrative support occupations	194	26.6	37.6
First-line supervisors managers of office and administrative support workers	12	1.6	34.6
Bookkeeping, accounting, and auditing clerks	16	2.2	33.9
Customer service representatives	23	3.2	57.0
Interviewers, except eligibility and loan	5	0.7	50.5
Receptionists and information clerks	6	0.8	57.0
Secretaries and administrative assistants	49	6.7	35.3
Data entry and information processing workers	9	1.2	2.1
Office clerks, general	41	5.6	36.7
Construction and extraction occupations	7	1.0	62.2
Installation, maintenance, and repair occupations	11	1.4	55.0
Production occupations	13	1.8	45.7
Transportation and material moving occupations	17	2.4	44.4
Laborers and freight, stock, and material movers, hand	6	0.8	28.9

NOTE: May not add to totals due to omission of occupations with small employment.

In management, scientific, and technical consulting services, workers in management and business and financial operations occupations and in professional and related occupations make up 57 percent of employment. These same occupations account for about 30 percent of workers across the entire economy. This group of workers makes up a disproportionate share of jobs in the industry, because workers with education and experience in business management and workers with scientific, engineering, and other technical backgrounds conduct most of the consulting work in the industry.

Top executives, the largest managerial occupation in the industry, includes both the highest-level managers—such as chief executive officers and vice presidents—and many top managers with diverse duties. In consulting firms, top executives with partial ownership and profit-sharing privileges might be referred to as partners. Top-level managers or partners shape company policy, often with the help of other executives or a board of directors. They oversee all activities of the firm, coordinate the duties of subordinate executives and managers, and often bear ultimate responsibility for a firm's performance. Midlevel managers or partners may oversee all the activities of one department or all the activities of one or more clients.

Management analysts, also called *management consultants*, is the largest occupation in the management consulting industry. Their work is quite varied, depending on the nature of the project and the client's needs. In general, consultants study and analyze business-related problems, synthesizing information from many sources, and recommend solutions. The solutions can include overhauling a client's computer systems, offering early retirement incentives to middle managers, recommending a switch in health plans, improving just-in-time inventory systems, hiring public-relations firms, or selling troublesome parts of businesses. Because of the varied nature of these jobs, firms hire workers with diverse backgrounds, such as engineering, finance, actuarial science, chemistry, and business. Many firms require consultants to have MBA's, whereas others hire workers who have only bachelor's degrees. Many workers have experience in other industries prior to entering management consulting work.

Other management and business and financial operations occupations include *administrative services managers*, who typically administer a consulting firm's support services. These managers oversee secretaries, data entry keyers, bookkeepers, and other clerical staff. In the management consulting services industry, they also often supervise a client's clerical and support staff and do consulting work in that area. *Advertising, marketing, promotions, public relations, and sales managers* oversee the consulting firm's marketing and sales departments, researching and targeting new clients and also helping on consulting projects having to do with marketing. *Computer and information systems managers* ensure that the consulting firm's computer and network systems are fully operational and oversee other computer and technical workers, such as computer support specialists. These managers might also supervise certain consulting projects involving computer and information technology. *Financial managers* prepare financial statements and assess the financial health of firms. Often, they must have at least a bachelor's degree in accounting or finance. *Human resources*,

training, and labor relations managers and specialists supervise the activities of a consulting firm's human resources department, managing personnel records, payroll, benefits, and employee recruitment and training. These managers might also supervise projects for clients in the human resources consulting industry. In scientific and technical consulting firms, *engineering and natural sciences managers* oversee the engineers and scientists working for their consulting firms. *Accountants and auditors* monitor firms' financial transactions and often report to financial managers. More recently, accountants and auditors have been involved in consulting projects for clients involving the preparation of financial statements, tax strategy, budget or retirement planning, and the implementation of accounting software.

Workers in professional and related occupations are employed mainly in the scientific and technical consulting portion of the industry. Many of these workers are engineers and scientists who utilize their expertise through consulting. For example, *environmental engineers* and *environmental scientists and geoscientists* are employed by environmental consulting firms to evaluate environmental damage or assess compliance with environmental laws and regulations. Other engineers, such as *agricultural, biomedical, chemical, mining and geological, nuclear, and petroleum engineers*, and physical and life scientists, such as *agricultural and food scientists, biological scientists, chemists, and materials scientists*, as well as *physicists and astronomers*, are employed by consulting firms specializing in their scientific disciplines. *Architects* and *civil and industrial engineers* are sometimes employed by safety and security consulting firms to assess the construction of buildings and other structures, such as bridges, and to make recommendations regarding reinforcing these structures against damage.

Other professional and related workers include *economists, market and survey researchers, and lawyers*. Economists are employed by economic consulting firms to conduct economic research and advise clients on economic trends. Market and survey researchers are mainly employed by marketing consulting firms to conduct surveys and research on various topics. Lawyers are employed in virtually all management, scientific, and technical consulting industries to represent their consulting firms in case of a lawsuit and to advise the firms, as well as clients, on changes in laws and regulations pertaining to their areas of expertise.

Designers in this industry are mostly *graphic designers* who use a variety of print, electronic, and film media to create designs that meet clients' commercial needs. Using computer software, these workers develop the overall layout and design of magazines, newspapers, journals, corporate reports, and other publications. They also may produce promotional displays and marketing brochures for products and services and may design distinctive company logos for products and businesses. An increasing number of graphic designers develop material to appear on Internet homepages.

The rapid spread of computers and information technology has generated a need for highly trained computer specialists to design and develop new hardware and software systems and to incorporate new technologies. *Systems analysts* design new computer systems or redesign old systems for new applications. They

solve computer problems and enable computer technology to meet their organization's particular needs. For example, a systems analyst from a management consulting firm might be hired by a wholesale firm to implement an online inventory database. *Computer software engineers*, by contrast, can be involved in the design and development of software systems for the control and automation of manufacturing, business, and management processes. Other computer specialists include *computer support specialists*, who provide technical assistance, support, and advice to customers and users, and *database administrators*, who work with database management systems software and determine ways to organize and store data. Computer specialists such as systems analysts, computer scientists, and computer engineers sometimes are referred to simply as "consultants."

Technical workers also include *computer programmers*, who write programs and create software—often in close conjunction with systems analysts—and *engineering technicians*, who aid engineers in research and development. Like systems analysts and engineers, these workers are found primarily in the business and management consulting segments of the industry.

Administrative support positions in management, scientific, and technical consulting services resemble those in other industries, and account for 27 percent of industry employment. Particularly numerous are *secretaries* and *administrative assistants* and *bookkeeping, accounting, and auditing clerks*, who record and classify financial data. The industry also employs many *supervisors and managers of office and administrative support workers*, who oversee the support staff, often reporting to administrative services managers.

Management, scientific, and technical consulting services firms do not produce any goods and, as a result, employ relatively few services, sales, and production workers, who, together with the remaining occupational groups, make up only about 11 percent of industry employment.

Training and Advancement

Training and advancement opportunities vary widely within management, scientific, and technical consulting services, but most jobs in the industry are similar in three respects. First, clients usually hire consulting firms on the basis of the expertise of their staffs, so proper training of employees is vital to the success of firms. Second, although a bachelor's or higher degree generally is preferred by employers, most jobs also require extensive on-the-job training or related experience. Third, advancement opportunities are best for workers with the highest levels of education.

Most consulting specialties provide a variety of different ways to enter the profession. Whereas very few universities or colleges offer formal programs of study in management consulting, many fields provide a suitable background. These fields include most areas of business and management, such as marketing and accounting, as well as economics, computer and information sciences, and engineering. Some schools offer programs in logistics and safety that relate directly to consulting jobs in those areas. Some college graduates with a bachelor's or master's degree, but without any previous work experience, are hired right out of school by consulting firms and go through extensive on-the-job training. The method and extent of training can vary

with the type of consulting involved and the nature of the firm. Some college students might have an advantage over other candidates if they complete an internship with a consulting firm during their studies. Other workers with related experience are hired as consultants later in their careers. For example, former military or law enforcement workers often work for security consulting firms. Similarly, some government workers with experience in enforcing regulations might join an environmental or safety consulting firm. Consultants in scientific fields often have a master's or doctoral degree, and some previously have taught at colleges and universities.

Most organizations require their employees to possess a variety of skills. To a large extent, a degree is only one desired qualification; workers must also possess proven analytical and problem-solving abilities, excellent written and verbal communications skills, experience in a particular specialty, assertiveness and motivation, strong attention to detail, and a willingness to work long hours if necessary. Consultants also must possess high ethical standards, because most consulting firms and clients will contact references and former clients to make sure that the quality of their work was of the highest standard.

Management and leadership classes and seminars are available throughout the United States. Some are hosted by volunteer senior executives and management experts representing a variety of businesses and industries. A number of large firms invest a great deal of time and money in training programs, educating new hires in formal classroom settings over several weeks or even months, and some even have separate training facilities. Small firms often combine formal and on-the-job training.

The Institute of Management Consultants USA, Inc. (IMC USA), offers a wide range of professional development programs and resources, such as meetings and workshops that can be helpful for management consultants. The IMC USA also offers the certified management consultant (CMC) designation to those who meet minimum levels of education and experience, submit reviews from clients, and pass an interview and exam covering the IMC USA's code of ethics. Management consultants with a CMC designation must be recertified every 3 years.

Other areas of specialization, such as logistics and safety, also offer certification programs for professionals, but these programs are not necessarily designed for consultants. Still, consultants might find it beneficial to receive designations from these programs as well. Although certification is not mandatory for management consultants, it may give a jobseeker a competitive advantage.

Entry-level positions within the management consulting industry involve very little responsibility at the beginning. Striving for and displaying quality work results in more responsibility. Most management consulting firms have two entry-level positions. Workers who hold bachelor's degrees usually start as research associates; those with graduate degrees generally begin as consultants. Successful workers progress through the ranks from research associate to consultant, management consultant, senior consultant, junior partner, and, after many years, senior partner. In some firms, however, it is very difficult for research associates to progress to the next level without further education. As a result, many management consulting firms offer tu-

ition assistance, grants, or reimbursement plans so that workers can attain an MBA or some other degree.

Almost all workers in management consulting services receive on-the-job training; some have prior work experience in a related field. Most managerial and supervisory workers gain experience informally, overseeing a few workers or part of a project under the close supervision of a senior manager. Workers who advance to high-level managerial or supervisory jobs in management services firms usually have an extensive educational background. Less commonly, some large firms offer formal management training.

The management, scientific, and technical consulting services industry offers excellent opportunities for self-employment. Because capital requirements are low, highly experienced workers can start their own businesses fairly easily and cheaply; indeed, every year, thousands of workers in this industry go into business for themselves. Some of these workers come from established management, scientific, and technical consulting services firms, whereas others leave industry, government, or academic jobs to start their own businesses. Still others remain employed in their primary organizations, but have their own consulting jobs on the side.

Earnings

Earnings in management, scientific, and technical consulting services typically are considerably higher than the average for the entire economy. Nonsupervisory wage and salary workers in the industry averaged \$809 a week in 2002, compared with \$506 for workers throughout private industry. Earnings in the largest occupations in management, scientific, and technical consulting appear in table 2.

The data in the table do not reflect earnings for self-employed workers, who often are paid very well. Also, both managerial workers and high-level professionals can make considerably more than the industry average. According to a 2002 survey by the Association of Management Consulting Firms, the average total cash compensation (salary plus bonus or profit sharing) for research associates was \$47,826; for entry-level consultants,

Table 2. Median hourly earnings of the largest occupations in management, scientific, and technical consulting services, 2002

Occupation	Management, scientific, and technical consulting services	All industries
General and operations managers	\$46.58	\$32.80
Management analysts	34.52	29.01
Employment, recruitment, and placement specialists	25.88	18.95
Accountants and auditors	20.88	22.60
Executive secretaries and administrative assistants	16.71	16.06
Bookkeeping, accounting, and auditing clerks	14.30	13.16
Customer service representatives	13.27	12.62
Secretaries, except legal, medical, and executive	12.98	12.16
Telemarketers	9.70	9.40
Office clerks, general	9.47	10.71

\$61,496; for management consultants, \$78,932; for senior consultants, \$112,716; for junior partners, \$168,998; and for senior partners, \$254,817.

According to a 2003 survey conducted by Abbot, Langer, and Associates, the median annual cash compensation for junior consultants was \$48,248; for consultants, \$58,817; for senior consultants, \$80,000; for principal consultants, \$98,000; and for senior or executive vice presidents (with an ownership interest in the firm), \$144,200.

Besides earning a straight salary, many workers receive additional compensation, such as profit sharing, stock ownership, or performance-based bonuses. In some firms, bonuses can constitute one-third of annual pay.

Only about 2 percent of workers in management, scientific, and technical consulting services belong to unions or are covered by union contracts, compared with 15 percent of workers in all industries combined.

Outlook

Between 2002 and 2012, wage and salary jobs in the management, scientific, and technical consulting services industry are expected to grow by 55 percent—three and half times the 16 percent growth projected for all industries combined, ranking the industry fifth among the most rapidly growing ones. All areas of consulting should experience strong growth. Still, despite the projected growth in the industry, job competition should remain keen because the prestigious and independent nature of the work and the generous salary and benefits attract more jobseekers than openings every year. Because of the high degree of competition, those with the most education and job experience will likely have the best prospects.

Projected job growth can be attributed primarily to economic growth and the continuing complexity of business. A growing number of businesses means increased demand for advice in all areas of business planning, as consultants draft business plans and budgets, develop strategy, and determine appropriate salaries and benefits for employees. The expansion of franchised restaurants and retail stores will spur demand for marketing consultants to determine the best locations and develop marketing plans. The expansion of business will also create opportunities for logistics consulting firms trying to link new suppliers with producers and to get the finished goods to consumers. Finally, businesses will continue to need advice on compliance with government workplace safety and environmental laws. Clients need consultants to keep them up to date on the latest changes in legislation affecting their businesses, including changes to tax laws, environmental regulations, and policies affecting employee benefits and health care and workplace safety. As a result, firms specializing in human resources, environmental, and safety consulting should be in strong demand.

The increasing use of new technology and computer software is another major factor contributing to growth in all areas of consulting. Management consulting firms help clients implement new accounting and payroll software, whereas environmental and safety consulting firms advise clients on the use of computer technology in monitoring harmful substances in the environment or workplace. Consulting firms might also help design new com-

puter systems or online distribution systems. One of the biggest areas upon which technology has had an impact is logistics consulting. The Internet has greatly increased the ability of businesses to link with their suppliers and customers, increasing productivity and decreasing costs. Technology-related consulting projects have become so important that many traditional consulting firms are now merging with or setting up joint ventures with technology companies so that each firm has access to the other's resources in order to serve clients better.

The trend toward outsourcing and mergers also will create opportunities for consulting firms. In order to cut costs, many firms are outsourcing administrative and human resources functions to consultants specializing in these services. This should provide opportunities in human resources consulting for firms that manage their clients' payroll systems and benefits programs. At the same time, increasing competition has led to more business mergers, providing opportunities for consulting firms to assist in the process.

Globalization, too, will continue to provide numerous opportunities for consulting firms wishing to expand their services, or help their clients expand, into foreign markets. Consulting firms can advise clients on strategy, as well as foreign laws, regarding taxes, employment, worker safety, and the environment. The growth of international businesses has created numerous opportunities for logistics consulting firms, because now businesses have an international network of suppliers and consumers, which requires more coordination.

Most recently, an increased emphasis on protecting a firm's employees, facilities, and information against deliberate acts of sabotage has created numerous opportunities for security consultants. These consultants provide assistance on every aspect of security, from protecting against computer viruses to reinforcing buildings against bomb blasts. Logistics consulting firms also are finding opportunities helping clients secure their supply chain against interruptions that might arise from terrorist acts, such as the disruption of shipping or railroad facilities. As security concerns grow, rising insurance costs, as well as the threat of lawsuits, are providing added incentives for businesses to protect the welfare of their employees.

Growth in management, scientific, and technical consulting services might be hampered by increasing competition from non-traditional consulting firms, such as investment banks, accounting firms, technology firms, and law firms. As consulting firms continue to expand their services, they will be forced to compete with a more diverse group of firms that provide similar services.

Economic downturns also can have an adverse effect on employment growth in consulting. As businesses are forced to cut costs, consultants may be among the first expenses that businesses eliminate. Furthermore, growth in some consulting specialties, such as executive search consulting, is directly tied to the health of the industries in which they operate. Still, some consulting firms might experience growth during recessions because, as clients look to cut costs and remain competitive, they might seek the advice of consultants.

Sources of Additional Information

For more information about career opportunities in general management consulting, contact:

- Association of Management Consulting Firms, 3580 Lexington Ave., New York, NY 10168. Internet: <http://www.amcf.org>

For more information about career opportunities in executive search consulting, contact:

- Association of Executive Search Consultants, 500 Fifth Ave., Suite 930, New York, NY 10110. Internet: <http://www.aesc.org>

For more information about career opportunities in logistics consulting contact:

- Council of Logistics Management, 2805 Butterfield Rd., Suite 200, Oak Brook, IL 60523. Internet: <http://www.clm1.org>

For more information about career opportunities in safety consulting, contact:

- American Society of Safety Engineers, 1800 E. Oakton St., Des Plaines, IL 60018. Internet: <http://www.asse.org>

For more information about the Certified Management Consultant designation, contact:

- Institute of Management Consultants USA, 2025 M St., Suite 800, Washington, DC 20036. Internet: <http://www.imcusa.org>

For more information about the Certified Investment Management Analyst designation, contact:

- Investment Management Consultants Association, 9101 E. Kenyon Ave., Suite 300, Denver, CO 80237. Internet: <http://www.imca.org>

In addition, information on the following occupations found in the management, scientific, and technical consulting services industry appears in the 2004-05 *Occupational Outlook Handbook*:

- Accountants and auditors
- Administrative services managers
- Advertising, marketing, promotions, public relations, and sales managers
- Architects, except landscape and naval
- Bookkeeping, accounting, and auditing clerks
- Computer and information systems managers
- Computer programmers
- Computer software engineers
- Computer support specialists and systems administrators
- Designers
- Economists
- Engineering and natural sciences managers
- Environmental engineers
- Environmental scientists and geoscientists
- Financial managers
- Human resources, training, and labor relations managers and specialists
- Lawyers
- Management analysts
- Office and administrative support worker supervisors and managers
- Secretaries and administrative assistants
- Systems analysts, computer scientists, and database administrators
- Top executives

Education and Health Services



Child Daycare Services

(NAICS 6244)

SIGNIFICANT POINTS

- Preschool teachers, teacher assistants, and childcare workers account for about 3 out of 4 wage and salary jobs.
- Training requirements for most jobs are minimal.
- Job openings should be numerous because dissatisfaction with benefits, pay, and working conditions causes many to leave the industry.

Nature of the Industry

Obtaining affordable, quality child daycare, especially for children under age 5, is a major concern for many parents. Child daycare needs are met in many different ways. Care in a child's home, care in an organized child daycare facility, or care in a provider's home are all common arrangements for preschool-age children. Older children may receive child daycare services when they are not in school, generally through before- and after-school programs or private summer school programs. With the increasing number of women in the workforce, child daycare services has been one of the most talked about and fastest growing industries in the U.S. economy.

This industry consists of establishments that provide paid care for infants, prekindergarten or preschool children, or older children in after-school programs. For information on other social assistance services for children and youths, see the *Career Guide* statement on social assistance, except child daycare.

Formal child daycare centers include nursery schools, preschool centers, Head Start centers, and group daycare centers. Self-employed workers in this industry often provide care in their home for a fee. Others provide care for children in the child's home. This industry does not include occasional babysitters or persons who provide unpaid care in their homes for the children of relatives or friends.

The for-profit sector of this industry includes centers that operate independently or as part of a local or national chain. Nonprofit child daycare organizations may provide services in religious institutions, YMCAs and other social and recreation centers, colleges, public schools, social service agencies, and worksites ranging from factories to office complexes. The number of for-profit establishments has grown rapidly in response to demand for child daycare services. Within the nonprofit sector, there has been strong growth in Head Start, the federally funded child daycare program designed to provide disadvantaged children with social, educational, and health services.

Child daycare shifted in the past from unpaid to paid caregivers, particularly child daycare centers. Center-based care has increased, substituting for unpaid care by relatives, as fewer families have access to relatives who are willing or able to keep their children.

Some employers offer child daycare benefits to employees. They recognize that the lack of child daycare benefits is a barrier to the employment of many parents, especially qualified women,

and that the cost of the benefits is offset by increased employee morale and reduced absenteeism. Some employers sponsor child daycare centers in or near the workplace; others offer direct financial assistance, vouchers, or discounts for child daycare, after-school or sick-child daycare services, or a dependent care option in a flexible benefits plan.

Working Conditions

Watching children grow, learn, and gain new skills can be very rewarding. Preschool teachers and childcare workers often improve their own communication, learning, and other personal skills by working with children. The work is never routine; new activities and challenges mark each day. However, child daycare can be physically and emotionally taxing, as workers constantly stand, walk, bend, stoop, and lift to attend to each child's interests and problems. They must be constantly alert, anticipate and prevent trouble, deal effectively with disruptive children, and provide fair but firm discipline. Nonetheless, this is a relatively safe industry; in 2002, child daycare services had an injury and illness rate of 2.9 per 100 full-time workers, compared with a rate of 5.3 throughout private industry.

The hours of child daycare workers vary. Many centers are open 12 or more hours a day and cannot close until all of the children are picked up by their parents or guardians. Unscheduled overtime, traffic jams, and other types of emergencies can cause parents or guardians to be late. Nearly one third of the full-time employees in the child daycare services industry work more than 40 hours per week. Self-employed workers tend to work longer hours than do their salaried counterparts. The industry also offers many opportunities for part-time work—about a third of all employees worked part time in 2002.

Many child daycare workers become dissatisfied with their jobs' stressful conditions, low pay, and lack of benefits and eventually leave. The proportion of child daycare workers who need to be replaced each year is much higher than the average for all occupations.

Employment

Child daycare services provided about 734,000 wage and salary jobs in 2002. Also, about 517,000 self-employed persons worked in the industry. Most of the self-employed were family childcare providers, and some were self-employed managers of child daycare centers. However, employment estimates understate the

total number of people working in this industry because they exclude family childcare homes run by relatives and other family childcare providers; these providers function under exemption clauses in State regulations that allow them to operate without a license if they care for a limited number of children.

Jobs in child daycare are found across the country, mirroring the distribution of the population. Child daycare operations vary in size, from the self-employed person caring for a few children in a private home to the large corporate-sponsored center employing a large staff. About half of all wage and salary jobs in 2002 were located in establishments with fewer than 20 employees. Nearly all establishments have fewer than 50 workers (chart).

Opportunities for self-employment in this industry are among the best in the economy. More than 40 percent of all workers in the industry are self-employed, compared with only 8 percent in all industries. This reflects the ease of entering the child daycare business.

Table 1. Percent distribution of employment in child daycare services by age group, 2002

Age group	Child day care services	All industries
Total	100.0	100.0
16 to 19	8.0	4.6
20 to 24	14.9	9.8
25 to 34	24.7	22.2
35 to 44	23.1	25.8
45 to 54	18.2	22.9
55 to 64	8.7	11.5
65 and older	2.4	3.2

The median age of child daycare providers is 36, compared with 40 for all workers. About 23 percent of all care providers are 24 years of age or younger (table 1). About 8 percent of these workers are below the age of 20, reflecting the minimal training requirements for many child daycare positions.

More than 80 percent of all child daycare services establishments employ fewer than 20 workers and, together, they account for nearly half of the industry's jobs



Occupations in the Industry

There is far less occupational diversity in the child daycare services industry than in most other industries. Three occupations—*preschool teachers*, *teacher assistants*, and *childcare workers*—account for 75 percent of all wage and salary jobs (table 2).

Table 2. Employment of wage and salary workers in child daycare services by occupation, 2002 and projected change, 2002-12

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	734	100.0	43.1
Management, business, and financial occupations	53	7.2	39.9
General and operations managers	9	1.2	44.3
Education administrators, preschool and child care center/program	32	4.4	36.0
Professional and related occupations	403	54.9	42.1
Child, family, and school social workers ...	7	1.0	48.5
Social and human service assistants	6	0.8	75.6
Preschool teachers, except special education	266	36.3	42.7
Kindergarten teachers, except special education	9	1.2	33.6
Elementary school teachers, except special education	5	0.7	28.4
Teacher assistants	91	12.3	39.0
Service occupations	240	32.6	47.3
Cooks, institution and cafeteria	17	2.3	17.7
Building cleaning workers	9	1.2	38.6
First-line supervisors/managers of personal service workers	7	1.0	48.5
Child care workers	190	25.9	50.3
Office and administrative support occupations	27	3.7	27.7
Bookkeeping, accounting, and auditing clerks	5	0.7	26.7
Secretaries and administrative assistants	8	1.1	22.3
Office clerks, general	7	0.9	29.3
Transportation and material moving occupations	10	1.3	36.4
Bus drivers, school	7	0.9	36.0

NOTE: May not add to totals due to omission of occupations with small employment.

Preschool teachers make up the largest occupation in the child daycare industry, accounting for about 36 percent of wage and salary jobs. They teach pupils basic physical, intellectual, and social skills needed to enter primary school. *Teacher assistants* account for 12 percent of employment. They give teachers more time for teaching by assuming a variety of tasks. For example, they may set up and dismantle equipment or prepare instructional materials.

Childcare workers account for about 25 percent of wage and salary jobs. Large proportions of the self-employed who keep children in their homes also are childcare workers. In a home

setting, they are known as *family childcare providers*. Some parents hire *private household workers*, such as *nannies*, to care for their children in their own home. Regardless of the setting, these workers feed, diaper, comfort, and play with infants. When dealing with older preschoolers, they attend to the children's basic needs and organize activities that stimulate physical, emotional, intellectual, and social development.

Education administrators, preschool and child care center/program account for about 4 percent of wage and salary workers. They establish overall objectives and standards for their center and provide day-to-day supervision of their staff. They bear overall responsibility for program development, as well as for marketing, budgeting, staffing, and all other administrative tasks.

In addition to the above occupations, child daycare centers also employ a variety of *office and administrative support workers, building cleaning workers, cooks, and busdrivers*.

Training and Advancement

Most States do not impose training requirements for family childcare providers. However, many local governments offer training and require family childcare providers to obtain licenses. Home safety inspections and criminal background checks are usually required of an applicant. In the case of child daycare centers, however, staffing requirements are imposed primarily by the States and by insurers. Although requirements vary, in most cases a minimum age of 18 is required for teachers, and directors or officers must be at least 21. In some States, assistants may work at age 16, and in several States, at 14.

Most States have established minimum educational or training requirements. Training requirements are most stringent for directors, less so for teachers, and minimal for childcare workers and teacher assistants. In many centers, directors must have a college degree, often with experience in child daycare and specific training in early childhood development. Teachers must have a high school diploma and, in many cases, a combination of college education and experience. Assistants and childcare workers usually need a high school diploma, but it is not always a requirement. Some employers prefer to hire workers who have received credentials from a nationally recognized child daycare organization.

Many States also mandate other types of training for staff members, such as health and first aid, fire safety, and child abuse detection and prevention. In nearly all States, licensing regulations require criminal record checks for all child daycare staff. This screening requirement protects children from abuse and reduces liability risks, making insurance more available and affordable.

State governments also have established requirements for other child daycare center personnel involved in food preparation, transportation of children, provision of medical services, and other services. Most States have defined minimum staff-to-children ratios. These vary depending on the State and the age of the children involved.

Earnings

In 2002, hourly earnings of nonsupervisory workers in the child daycare services industry averaged \$9.50, much less than the

average of \$14.95 throughout private industry. On a weekly basis, earnings in child daycare services averaged only \$284 in 2002, compared with the average of \$506 in private industry. Weekly earnings reflect, in part, hours worked—salaried workers in child daycare services averaged 29.9 hours a week, compared with about 33.9 throughout private industry. Earnings in selected occupations in child daycare services in 2002 appear in table 3.

Table 3. Median hourly earnings of the largest occupations in child daycare services, 2002

Occupation	Child daycare services	All industries
General and operations managers	\$17.66	\$32.80
Education administrators, preschool and child care center/program	14.52	16.03
Child, family, and school social workers	12.60	15.94
First-line supervisors/managers of personal service workers	11.52	13.92
Bus drivers, school	9.00	10.77
Preschool teachers, except special education	8.69	9.26
Office clerks, general	8.63	10.71
Janitors and cleaners, except maids and housekeeping cleaners	7.96	8.77
Cooks, institution and cafeteria	7.77	8.72
Child care workers	7.18	7.86

Employee benefits often are minimal as well. A substantial number of child daycare centers offer no healthcare benefits to any teaching staff. Reduced child daycare fees for workers' children, however, are a common benefit. Wage levels and employee benefits depend in part on the type of child daycare center. Nonprofit and religiously affiliated centers generally pay higher wages and offer more generous benefits than do for-profit establishments.

In 2002, less than 4 percent of all workers in child daycare services were union members or covered by union contract, compared with about 15 percent of workers in all industries.

Outlook

Wage and salary jobs in the child daycare services industry are projected to grow 43 percent over the 2002-12 period, compared with the 16 percent employment growth projected for all industries combined. An unusually large number of job openings also will result each year from the need to replace experienced workers who leave this industry. Replacement needs are substantial, reflecting the low wages and relatively meager benefits. Faster-than-average employment growth, when coupled with substantial replacement needs, should create numerous employment opportunities.

The rising demand for child daycare services reflects demographic trends. Over the 2002-12 period, the number of women of childbearing age (widely considered to be ages 15 to 44) is expected to grow very slowly; however, the labor force participation rate of such women is expected to increase. As a result, the number of women in the labor force with children young enough to require child daycare will increase steadily. Also, the number of children under age 5 is expected to increase during this period.

The demand for child daycare services will continue to grow. As the labor force participation of women between the ages of 16 and 44 remains high, parents of preschool and school-age children are expected to seek more daycare arrangements. As parents continue to work during weekends, evenings, and late nights, the demand will grow significantly for child daycare programs that can provide care during nontraditional hours. School-age children, who generally require child daycare only before and after school, increasingly are being cared for in centers.

Center-based care should continue to expand its share of the industry as government increases its involvement in promoting and funding child daycare services. Increased subsidies for children from low-income families attending child daycare programs would result in more children being served in centers. Demand for preschool teachers could increase if many States implement mandatory preschool for 4-year-old children. Another factor that could result in more children being cared for in centers is the increasing involvement of employers in funding and operating daycare centers. Welfare reform legislation requiring more welfare recipients to work also could contribute to demand for child daycare services.

Sources of Additional Information

For additional information about careers in early childhood education, contact:

- National Association for the Education of Young Children, 1509 16th St. NW., Washington, DC 20036. Internet: <http://www.naeyc.org>

For more information about the childcare workforce, contact:

- Center for the Child Care Workforce, a project of the American Federation of Teachers Education Foundation, 555 New Jersey Ave., NW., Washington, DC 20001. Internet: <http://www.ccw.org>

For an electronic question-and-answer service on childcare, information on becoming a childcare provider, and other childcare resources, contact:

- National Child Care Information Center, 243 Church St. NW., 2nd floor, Vienna, VA 22180. Telephone (tollfree): 800-424-4310. Internet: <http://www.nccic.org>

For a database on licensing requirements of childcare settings by State, contact:

- National Resource Council for Health and Safety in Child Care, University of Colorado Health and Sciences Center at Fitzsimons, Campus Mail Stop F541, P.O. Box 6508, Aurora, CO 80045-0508. Telephone (tollfree): 800-598-5437. Internet: <http://nrc.uchsc.edu>

For a list of colleges offering courses in early childhood education, contact:

- Council for Professional Recognition, 2460 16th St. NW., Washington, DC 20009-3575. Internet: <http://www.cdacouncil.org>

For information on becoming a family childcare provider, send a stamped, self-addressed envelope to:

- The Children's Foundation, 725 15th St. NW., Suite 505, Washington, DC 20005-2109. Internet: <http://www.childrensfoundation.net>

State Departments of Human Services or Social Services can supply State regulations concerning child daycare programs, childcare workers, teacher assistants, and preschool teachers.

Detailed information on the following key occupations in the child daycare services industry appears in the 2004-05 *Occupational Outlook Handbook*:

- Education administrators
- Childcare workers
- Teacher assistants
- Teachers—preschool, kindergarten, elementary, middle, and secondary

SIGNIFICANT POINTS

- With about 1 in 4 Americans enrolled in educational institutions, educational services is the second largest industry, accounting for about 12.7 million jobs.
- Most teaching positions—which constitute almost half of all educational services jobs—require at least a bachelor's degree, and some require a master's or doctoral degree.
- Retirements in a number of education professions will create many job openings.

Nature of the Industry

Education is an important part of life. The amount and type of education that individuals receive are a major influence on both the types of jobs they are able to hold and their earnings. Lifelong learning is important in acquiring new knowledge and upgrading one's skills, particularly in this age of rapid technological and economic changes. The educational services industry includes a variety of institutions that offer academic education, vocational or career and technical instruction, and other education and training to millions of students each year.

Because school attendance is compulsory until at least age 16 in all 50 States and the District of Columbia, elementary, middle, and secondary schools are the most numerous of all educational establishments. Elementary, middle, and secondary schools provide academic instruction to students in kindergarten through grade 12, in public schools, parochial schools, boarding and other private schools, and military academies. Some secondary schools offer a mixture of academic and career and technical instruction.

Postsecondary institutions—universities, colleges, professional schools, community or junior colleges, and career and technical institutes—provide education and training in both academic and technical subjects for mainly adult students and those who have graduated high school. Universities offer bachelor's, master's, and doctoral degrees, while colleges generally offer only the bachelor's degree. Professional schools offer graduate degrees in fields such as law, medicine, business administration, and engineering. The undergraduate bachelor's degree typically requires 4 years of study, while graduate degrees require additional years of study. Community and junior colleges and technical institutes offer associate degrees, certificates, or other diplomas, typically involving 2 years of study or less. Career and technical schools provide specialized training and services primarily related to a specific job. They include computer and cosmetology training institutions, business and secretarial schools, correspondence schools, and establishments that offer certificates in commercial art and practical nursing.

Also included in this industry are institutions that provide training and services to the education industry, such as curriculum development and student exchanges. Also included are schools or programs that offer nonacademic or self-enrichment classes, such as automobile driving and cooking instruction, among other things.

In recent decades, the Nation has focused attention on the educational system because of the growing importance of pro-

ducing a trained and educated workforce. Many institutions, including government, private industry, and research organizations, are involved in improving the quality of education. The passage of the No Child Left Behind Act of 2001 established Federal guidelines to ensure that all students in public elementary through secondary schools receive a high-quality education. Through this act, individual States are given more flexibility on how to spend the educational funds they are allocated. At the same time, the Act requires standardized testing of all students in core subject areas. In this manner, students, teachers, and all staff involved in education will be held accountable for the results of testing, and teachers and teacher assistants will demonstrate that they are sufficiently qualified in the subjects or areas in which they are licensed to teach. States are responsible for following these guidelines and can lose Federal funding if the standards are not met. Prior to passage of the Act, in an effort to raise academic achievement among students and set standards for graduation, many States had already begun to introduce performance standards. Moreover, a growing number of States were requiring prospective teachers to pass basic skills tests before allowing them to teach.

In an effort to promote innovation in public education, many local and State governments have authorized the creation of public charter schools, in the belief that, by presenting students and their parents with a greater range of instructional options, schools and students will be encouraged to strive for excellence. Charter schools, which usually are run by teachers and parents or, increasingly, by private firms, operate independently of the school system, set their own standards, and practice a variety of innovative teaching methods. Businesses strive to improve education by donating instructional equipment, lending personnel for teaching and mentoring, hosting visits to the workplace, and providing job-shadowing and internship opportunities. Businesses also collaborate with educators to develop curricula that will provide students with the skills they need to cope with new technology in the workplace.

Quality improvements also are being made to career and technical education at secondary and postsecondary schools. Academics are playing a more important role in career and technical curricula, and programs are being made more relevant to the local job market. Often, students must meet rigorous standards, set in consultation with private industry, before receiving a certificate or degree. Career and technical students in secondary school

programs must pass the same standardized tests in core subject areas as students who are enrolled in academic programs of study. A growing number of career and technical programs are emphasizing general workplace skills such as problem solving, teamwork, and customer service. Many high schools now offer technical preparatory ("tech-prep") programs, which are developed jointly by high schools and community colleges to provide a continuous course of study leading to an associate's degree or other postsecondary credential.

Computer technology continues to affect the education industry. Computers simplify administrative tasks and make it easier to track student performance. Teachers use the Internet in classrooms as well as to communicate with colleagues around the country; students use the Internet for research projects. Distance learning continues to expand as more postsecondary institutions use Internet-based technology to post lessons and coursework electronically, allowing students in distant locations access to virtual classrooms.

Despite these improvements in quality, problems remain. Drop-out rates have not declined significantly over the decade, and employers contend that numerous high school students still lack many of the math and communication skills needed in today's workplace. School budgets often are not sufficient to meet the institution's various goals, particularly in the inner cities, where aging facilities and chronic teacher shortages make teaching difficult.

Working Conditions

School conditions often vary from town to town. Some schools in poorer neighborhoods may be rundown, have few supplies and equipment, and lack air conditioning. Other schools may be new and well equipped and maintained. Conditions at postsecondary institutions are generally very good. Regardless of the type of conditions facing elementary and secondary schools, seeing students develop and enjoy learning can be rewarding for teachers and other education workers. However, dealing with unmotivated students or those with social or behavioral problems can be stressful and require patience and understanding.

Most educational institutions operate 10 months a year, but summer sessions for remedial or adult students are not uncommon. Education administrators, office and administrative support workers, and janitors and cleaners often work the entire year. Night and weekend work is common for teachers of adult literacy and remedial and self-enrichment education, for postsecondary teachers, and for library workers in postsecondary institutions. Part-time work is common for this same group of teachers, as well as for teacher assistants and school busdrivers. The latter often work a split shift, driving one or two routes in the morning and afternoon; drivers who are assigned to drive students on field trips, to athletic and other extracurricular activities, or to midday kindergarten programs work additional hours during or after school. Many teachers spend significant time outside of school preparing for class, doing administrative tasks, conducting research, writing articles and books, and pursuing advanced degrees.

Despite occurrences of violence in some schools, educational services is a relatively safe industry. There were 2.8 cases of

occupational injury and illness per 100 full-time workers in private educational establishments in 2002, compared with 5.3 in all industries combined.

Employment

The educational services industry was the second largest industry in the economy in 2002, providing jobs for about 12.7 million workers—more than 12.5 million wage and salary workers, and 183,000 self-employed workers. The majority of wage and salary workers are employed in the public sector, because most students attend public educational institutions. According to the latest data from the Department of Education's National Center for Education Statistics, more than three-fourths of all elementary, middle, and secondary schools were public schools.

Employees in this industry are older than average; 47 percent are over the age of 45, compared with 38 percent of employees in all industries combined (table 1).

Table 1. Percent distribution of employment in educational services by age group, 2002

Age group	Educational services	All industries
Total	100.0%	100.0%
16-24	10.0	14.7
25-34	19.6	21.6
35-44	23.5	26.3
45-54	29.0	22.9
55-64	15.0	11.4
65 and older	2.9	3.2

Occupations in the Industry

Workers in the educational services industry take part in all aspects of education, from teaching and counseling students to driving school buses and serving cafeteria lunches. Although 2 out of 3 workers in educational services are employed in professional and related occupations, the industry employs many administrative support, managerial, service, and other workers (table 2).

Teachers account for almost half of all workers in the industry. Their duties depend on the age group and subject they teach, as well as on the type of institution in which they work. Teachers should have a sincere interest in helping students and should also have the ability to inspire respect, trust, and confidence. Strong speaking and writing skills, inquiring and analytical minds, and a desire to pursue and disseminate knowledge are vital prerequisites for teachers.

Preschool, kindergarten, and elementary school teachers play a critical role in the early development of children. They usually instruct one class in a variety of subjects, introducing the children to mathematics, language, science, and social studies. Often, they use games, artwork, music, computers, and other tools to teach basic skills.

Middle and secondary school teachers help students delve more deeply into subjects introduced in elementary school. Middle and secondary school teachers specialize in a specific academic subject, such as English, mathematics, or history, or a career and technical area, such as automobile mechanics, busi-

Table 2. Employment of wage and salary workers in educational services by occupation, 2002 and projected change, 2002-12

(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	12,527	100.0	19.9
Management, business, and financial occupations	825	6.6	23.0
Education administrators, elementary and secondary school	204	1.6	21.4
Education administrators, postsecondary	120	1.0	26.9
Professional and related occupations	8,210	65.5	23.9
Educational, vocational, and school counselors	177	1.4	13.7
Postsecondary teachers	1,512	12.1	38.3
Preschool teachers, except special education	67	0.5	27.0
Kindergarten teachers, except special education	154	1.2	28.3
Elementary school teachers, except special education	1,427	11.4	14.9
Middle school teachers, except special and vocational education	580	4.6	8.8
Secondary school teachers, except special and vocational education	982	7.8	18.1
Vocational education teachers, secondary school	102	0.8	9.3
Special education teachers, preschool, kindergarten, and elementary school	203	1.6	30.4
Special education teachers, middle school	86	0.7	30.5
Special education teachers, secondary school	131	1.0	30.3
Self-enrichment education teachers	80	0.6	53.5
All other teachers, primary, secondary, and adult	425	3.4	43.1
Librarians	94	0.7	6.4
Instructional coordinators	68	0.5	27.9
Teacher assistants	1,047	8.4	21.9
Coaches and scouts	65	0.5	23.5
Registered nurses	80	0.6	32.8
Service occupations	1,440	11.5	13.6
Security guards	62	0.5	7.0
Cooks, institution and cafeteria	181	1.4	2.7
Food preparation workers	88	0.7	8.8
Janitors and cleaners, except maids and housekeeping cleaners	477	3.8	16.6
Child care workers	112	0.9	19.3
Office and administrative support occupations	1,428	11.4	3.8
Bookkeeping, accounting, and auditing clerks	88	0.7	10.1
Executive secretaries and administrative assistants	193	1.5	11.9
Secretaries, except legal, medical, and executive	382	3.1	-2.8
Installation, maintenance, and repair occupations	164	1.3	17.2
Transportation and material moving occupations	321	2.6	11.9
Bus drivers, school	277	2.2	12.6

NOTE: May not add to totals due to omission of occupations with small employment.

ness education, or computer repair. Some supervise afterschool extracurricular activities, and some help students with academic decisions, such as choosing courses, colleges, and careers.

Special education teachers work with students—from toddlers to those in their early twenties—who have a variety of learning and physical disabilities. Most special education teachers teach at the elementary school level. Using the general education curriculum, special education teachers modify the instruction and, when necessary, develop alternative assessment methods to accommodate a student's special needs. They also help special education students develop emotionally, feel comfortable in social situations, and be aware of socially acceptable behavior.

Postsecondary teachers, or faculty, as they are usually called, generally are organized into departments or divisions, based on their subject or field. They teach and advise college students and perform a significant part of our Nation's research. They prepare lectures, exercises, and laboratory experiments; grade exams and papers; and advise and work with students individually. Postsecondary teachers keep abreast of developments in their field by reading current literature, talking with colleagues and businesses, and participating in professional conferences. They also consult with government, business, nonprofit, and community organizations. In addition, they do their own research to expand knowledge in their field, often publishing their findings in scholarly journals, books, and electronic media.

Adult literacy and remedial and self-enrichment education teachers teach English to speakers of other languages (ESOL), prepare sessions for the General Educational Development (GED) exam, and give basic instruction to out-of-school youths and adults. They also may teach classes that students take for personal enrichment, such as cooking or dancing.

Education administrators provide vision, direction, leadership, and day-to-day management of educational activities in schools, colleges and universities, businesses, correctional institutions, museums, and job training and community service organizations. They set educational standards and goals and aid in establishing the policies and procedures to carry them out. They develop academic programs; monitor students' educational progress; hire, train, motivate, and evaluate teachers and other staff; manage counseling and other student services; administer recordkeeping; prepare budgets; and handle relations with staff, parents, current and prospective students, employers, and the community.

Instructional coordinators evaluate school curricula and recommend changes to them. They research the latest teaching methods, textbooks, and other instructional materials and coordinate and provide training to teachers. They also coordinate equipment purchases and assist in the use of new technology in schools.

Educational, vocational, and school counselors work at the elementary, middle, secondary, and postsecondary school levels and help students evaluate their abilities, talents, and interests so that the students can develop realistic academic and career options. Using interviews, counseling sessions, tests, and other methods, secondary school counselors also help students understand and deal with their social, behavioral, and personal prob-

lems. They advise on college majors, admission requirements, and entrance exams and on trade, technical school, and apprenticeship programs. Elementary school counselors do more social and personal counseling and less career and academic counseling than do secondary school counselors. School counselors may work with students individually or in small groups, or they may work with entire classes.

Librarians help people find information and learn how to use it effectively in their scholastic, personal, and professional pursuits. Librarians manage library staff and develop and direct information programs and systems for the public, as well as oversee the selection and organization of library materials. *Library technicians* help librarians acquire, prepare, and organize material; direct library users to standard references; and retrieve information from computer databases. *Clerical library assistants* check out and receive library materials, collect overdue fines, and shelve materials.

Teacher assistants, also called *teacher aides* or *instructional aides*, provide instructional and clerical support for classroom teachers, allowing the teachers more time to plan lessons and to teach. Using the teacher's lesson plans in such manner as to provide students with individualized attention, teacher assistants tutor and assist children—particularly special education students—in learning class material. Assistants also aid and supervise students in the cafeteria, in the schoolyard, in hallways, or on field trips. They record grades, set up equipment, and prepare materials for instruction.

School busdrivers transport students to and from schools and related activities.

The educational services industry employs many other workers who are found in a wide range of industries. For example, office and administrative support workers such as *secretaries*, *administrative assistants*, and *general office clerks* account for about 1 out of 10 jobs in educational services.

Training and Advancement

The educational services industry employs some of the most highly educated workers in the labor force. Postsecondary teachers—particularly college and university faculty—generally need a doctoral degree for full-time, tenure-track employment, but sometimes can teach with a master's degree, especially at 2-year colleges. Most faculty members are hired as instructors or assistant professors and may advance to associate professor and full professor. Some faculty advance to administrative and managerial positions, such as department chairperson, dean, or president.

Kindergarten, elementary, middle, and secondary school teachers must have a bachelor's degree and complete an approved teacher training program, with a prescribed number of subject and education credits, as well as supervised practice teaching. All States require public school teachers to be licensed; however, licensure requirements vary by State. Many States offer alternative licensure programs for people who have bachelor's degrees in the subject they will teach, but lack the education courses required for a regular license. With additional education or certification, teachers may become school librarians, reading specialists, curriculum specialists, or guidance counselors. Some

teachers advance to administrative or supervisory positions—such as department chairperson, assistant principal, or principal—but the number of these jobs is limited. In some school systems, highly qualified, experienced elementary and secondary school teachers can become senior or mentor teachers, with higher pay and additional responsibilities.

Special education teachers have many of the same requirements as kindergarten, elementary, middle, and secondary school teachers. In addition, most States require specialized training in special education. A master's degree in special education, involving at least 1 year of additional course work, including a specialization, is also required by many States.

Vocational, or career and technical, education teachers sometimes need work or other experience in their field—and a license or certificate when required by the field—for full professional status. Most States require career and technical education teachers and adult literacy and remedial education teachers to have a bachelor's degree, and some States also require teacher certification. Self-enrichment teachers need only practical experience in the field in order to teach.

School counselors generally need a master's degree in a counseling specialty or a related field. All States require school counselors to hold State school counseling certification; however, certification procedures vary from State to State. Some States require public school counselors to have both counseling and teaching certificates. Depending on the State, a master's degree in counseling and 2 to 5 years of teaching experience may be required for a counseling certificate. Experienced school counselors may advance to a larger school; become directors or supervisors of counseling, guidance, or student personnel services; or, with further graduate education, become counseling psychologists or school administrators.

Training requirements for education administrators depend on where they work. Principals, assistant principals, and school administrators usually have held a teaching or related job before entering administration, and they generally need a master's or doctoral degree in education administration or educational supervision, as well as State teacher certification. Academic deans usually have a doctorate in their specialty. Education administrators may advance up an administrative ladder or transfer to larger schools or school systems. They also may become superintendent of a school system or president of an educational institution.

Training requirements for teacher assistants range from a high school diploma to some college training. The No Child Left Behind Act mandates that all new teacher assistants working in schools that receive Title I funds have a minimum of an associate's degree or the equivalent, and that current workers meet these requirements by 2006. Districts that assign teaching responsibilities to teacher assistants usually have higher training requirements than those which do not. Teacher assistants who obtain a bachelor's degree, usually in education, may become certified teachers.

Librarians normally need a master's degree in library science. Many States require school librarians to be licensed as teachers and have courses in library science. Experienced librarians may advance to administrative positions, such as department head,

library director, or chief information officer. Training requirements for library technicians range from a high school diploma to specialized postsecondary training; a high school diploma is sufficient for library assistants. Library workers can advance—from assistant, to technician, to librarian—with experience and the required formal education. School busdrivers, need a commercial driver's license and have limited opportunities for advancement; some become supervisors or dispatchers.

Earnings

Earnings of occupations concentrated in the educational services industry—education administrators, teachers, counselors, and librarians—are significantly higher than the average for all occupations, because the workers tend to be older and have higher levels of educational attainment. Among teachers, earnings increase with higher educational attainment and more years of service. Full-time postsecondary teachers earn the most, followed by elementary, middle, and secondary school teachers. Most teachers are paid a salary, but part-time instructors in postsecondary institutions usually are paid a fixed amount per course. Educational services employees who work the traditional school year can earn additional money during the summer in jobs related to, or outside of, education. Benefits generally are good, but, as in other industries, part-time workers often do not receive the same benefits that full-time workers do. Earnings for selected occupations within private education institutions only appear in table 3.

Almost 40 percent of workers in the educational services industry—the largest number being in elementary, middle, and secondary schools—are union members or are covered by union contracts, compared with only 15 percent of workers in all industries combined. The American Federation of Teachers and the National Education Association are the largest unions representing teachers and other school personnel.

Outlook

Wage and salary employment growth of 20 percent is expected in the educational services industry over the 2002–12 period, higher than the 16 percent increase projected for all industries combined. In addition, a greater-than-average number of workers are over the age of 45 in nearly all the major occupations that make up the industry—from janitors to education administrators—so it is likely that a surge in retirements will create large numbers of job openings in addition to those due to employment growth (chart).

School districts, particularly those in urban and rural areas, continue to report difficulties in recruiting qualified teachers, administrators, and support personnel. Also, many schools in fast-growing areas of the country—including several States and cities in the South and West—report difficulty recruiting education workers, especially teachers. As retirements increase over the projection decade, the number of students graduating with education degrees may not be sufficient to meet this industry's growing needs, making job opportunities for graduates in many education fields good to excellent. Currently, alternative licensing programs are helping to attract noneducation majors into teaching. In addition, the current economic downturn has led to an increase in the number of job applicants for teacher positions,

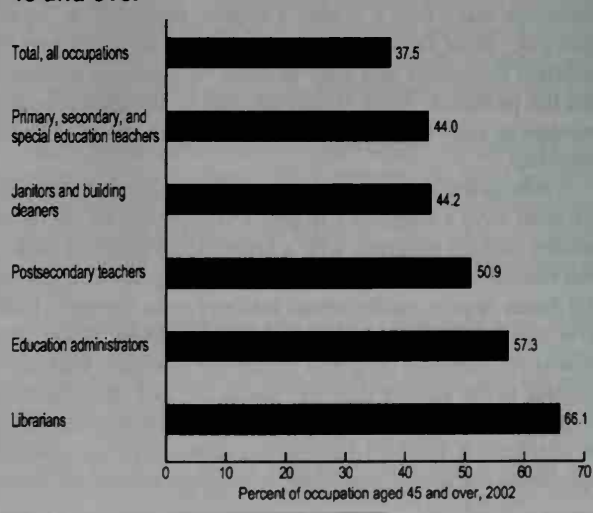
Table 3. Median hourly earnings of the largest occupations in private educational services, 2002

Occupation	Educational services, private	All industries
Education administrators, postsecondary ...	\$31.06	\$31.08
Educational, vocational, and school counselors	22.47	21.20
Librarians	21.97	20.72
Vocational education teachers, postsecondary	18.88	-
Executive secretaries and administrative assistants	15.58	16.06
Secretaries, except legal, medical, and executive	12.34	12.16
Janitors and cleaners, except maids and housekeeping cleaners	10.82	8.77
Office clerks, general	10.80	10.71
Child care workers	8.99	7.86
Cooks, institution and cafeteria	7.97	8.72

a factor that has helped to alleviate some of the personnel shortages experienced in previous years. Still, opportunities should continue to be very good for highly qualified teachers, especially those in subject areas such as math, science, and bilingual education.

At the postsecondary level, increases in student enrollments and projected retirements of current faculty should contribute to a favorable job market for postsecondary teachers. As children of the baby boom continue to reach college age, and as more adults pursue continuing education to enhance or update their skills, postsecondary student enrollments are expected to increase, spurring much faster-than-average employment growth for postsecondary teachers. However, candidates applying for tenured positions will continue to face keen competition as many colleges and universities reduce the number of these positions in favor of adjunct or part-time faculty.

Some of the largest occupations in educational services have a high proportion of workers aged 45 and over



Over the long-term, a growing emphasis on improving education and making it available to more children and young adults will increase overall demand for workers in education services. Reforms, such as universal preschool, all-day kindergarten, and reduced class sizes, if enacted, would require more preschool and elementary school teachers. However, flat enrollment projections at the preschool, elementary, and secondary school level are likely to slow growth somewhat, resulting in average growth for these teachers.

The number of special education teachers is projected to grow faster than the average through 2012, with growth stemming from an increasing enrollment of special education students, continued emphasis on the inclusion of disabled students in general education classrooms, and an effort to reach students with problems at younger ages. Employment of teacher assistants also will grow faster than the average; school reforms call for more individual attention to students, and additional teacher assistants will be needed in general education, special education, and English-as-a-second-language classrooms.

Despite expected increases in education expenditures over the next decade, budget constraints at all levels of government may place restrictions on educational services, particularly in light of the rapidly escalating costs of college tuition, special education, construction for new schools, and other services. Cuts in funding could affect student services (such as school busing, library and educational materials, and extracurricular activities), as well as employment of administrative, instructional, and support staff. Budget considerations also may affect attempts to expand school programs, such as increasing the number of counselors and teacher assistants in elementary

schools. In States with severe budget problems, schools may be forced to increase their class size, cut back on hiring and training teachers, or even possibly lay off teachers.

Sources of Additional Information

Information on unions and education-related issues can be obtained from the following organizations:

- American Federation of Teachers, 555 New Jersey Ave. NW, Washington, DC 20001.
- National Education Association, 1201 16th St. NW, Washington, DC 20036.

Information on most occupations in the educational services industry, including the following, appears in the 2004–05 edition of the *Occupational Outlook Handbook*:

- Busdrivers
- Counselors
- Education administrators
- Instructional coordinators
- Librarians
- Library assistants, clerical
- Library technicians
- Teacher assistants
- Teachers—adult literacy and remedial and self-enrichment education
- Teachers—postsecondary
- Teachers—preschool, kindergarten, elementary, middle, and secondary
- Teachers—special education

Health Services

(NAICS 62, except 624)

SIGNIFICANT POINTS

- As the largest industry in 2002, health services provided 12.9 million jobs—12.5 million jobs for wage and salary workers and about 382,000 jobs for the self-employed.
- Ten out of 20 occupations projected to grow the fastest are concentrated in health services.
- About 16 percent of all new wage and salary jobs created between 2002 and 2012 will be in health services—3.5 million jobs, which is more than in any other industry.
- The majority of jobs require less than 4 years of college education, but health diagnosing and treating practitioners are among the most educated workers.

Nature of the Industry

Combining medical technology and the human touch, the health services industry administers care around the clock, responding to the needs of millions of people—from newborns to the critically ill.

About 518,000 establishments make up the health services industry; all vary greatly in terms of size, staffing patterns, and organizational structures. Three-fourths of all health services establishments are offices of physicians, dentists, or other health practitioners. Although hospitals constitute only 2 percent of all health services establishments, they employ 41 percent of all workers (table 1).

Table 1. Percent distribution of wage and salary employment and establishments in health services, 2002

Establishment type	Establishments	Employment
Health services, total.....	100.0	100.0
Hospitals, public and private	1.9	40.9
Nursing and residential care facilities	11.7	22.1
Offices of physicians	37.3	15.5
Offices of dentists	21.6	5.9
Home healthcare services	2.8	5.5
Offices of other health practitioners	18.2	3.9
Outpatient care centers	3.1	3.3
Other ambulatory healthcare services	1.5	1.5
Medical and diagnostic laboratories	1.9	1.4

The health services industry includes establishments ranging from small-town private practices of physicians who employ only one medical assistant to busy inner-city hospitals that provide thousands of diverse jobs. Almost 3 out of 4 nonhospital health services establishments employed fewer than 10 workers (chart 1). By contrast, more than 2 out of 3 hospital employees were in establishments with more than 1,000 workers (chart 2).

The health services industry consists of the following nine segments:

Hospitals. Hospitals provide complete medical care, ranging from diagnostic services, to surgery, to continuous nursing care. Some hospitals specialize in treatment of the mentally ill, cancer patients, or children. Hospital-based care may be on an inpatient (overnight) or outpatient basis. The mix of workers needed

varies, depending on the size, geographic location, goals, philosophy, funding, organization, and management style of the institution. As hospitals work to improve efficiency, care continues to shift from an inpatient to outpatient basis whenever possible. Many hospitals have expanded into long-term and home healthcare services, providing a wide range of care for the communities they serve.

Nursing and residential care facilities. Nursing care facilities provide inpatient nursing, rehabilitation, and health-related personal care to those who need continuous nursing care, but do not require hospital services. Nursing aides provide the vast majority of direct care. Other facilities, such as convalescent homes, help patients who need less assistance. Residential care facilities provide around-the-clock social and personal care to children, the elderly, and others who have limited ability to care for themselves. Workers care for residents of assisted-living facilities, alcohol and drug rehabilitation centers, group homes,

Chart 1. Almost 3 out of 4 nonhospital health services establishments employ fewer than 10 workers

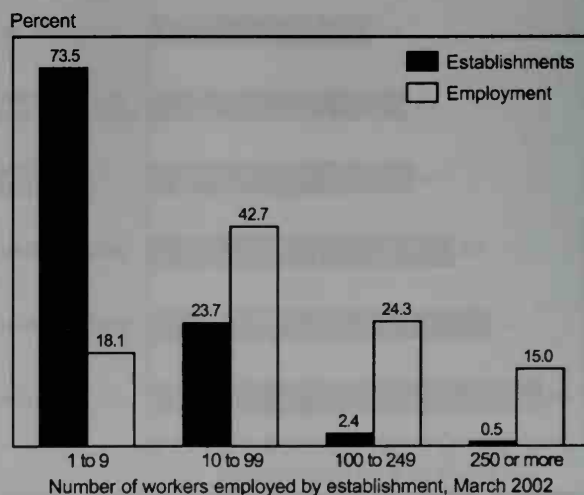
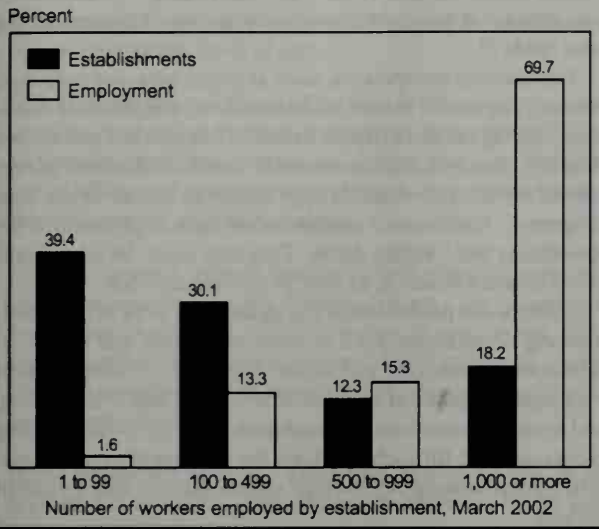


Chart 2. More than 2 out of 3 jobs in hospitals are in establishments employing 1,000 or more workers



and halfway houses. Nursing and medical care, however, is not the main focus of establishments providing residential care, as it is in nursing care facilities.

Offices of physicians. More than a third of all health services establishments fall into this industry segment. Physicians and surgeons practice privately or in groups of practitioners who have the same or different specialties. Many physicians and surgeons prefer to join group practices because they afford backup coverage, reduce overhead expenses, and facilitate consultation with peers. Physicians and surgeons are increasingly working as salaried employees of group medical practices, clinics, or integrated health systems.

Offices of dentists. About 1 out of every 5 health services establishments is a dentist's office. Most employ only a few workers, who provide general or specialized dental care, including dental surgery.

Home healthcare services. Skilled nursing or medical care is sometimes provided in the home, under a physician's supervision. Home healthcare services are provided mainly to the elderly. The development of in-home medical technologies, substantial cost savings, and patients' preference for care in the home have helped make this once-small segment of the industry into one of the fastest growing in the economy.

Offices of other health practitioners. This segment of the industry includes the offices of chiropractors, optometrists, podiatrists, occupational and physical therapists, psychologists, audiologists, speech-language pathologists, dietitians, and other miscellaneous health practitioners. Demand for the services of the segment is related to the ability of patients to pay, either directly or through health insurance. Hospitals and nursing facilities may contract out for these services. This segment also includes practitioners of alternative medicine, such as acupuncturists, homeopaths, hypnotherapists, and naturopaths.

Outpatient care centers. Among the diverse establishments in this group are kidney dialysis centers, outpatient mental health and substance abuse centers, health maintenance organization medical centers, and freestanding ambulatory surgical and emergency centers.

Other ambulatory healthcare services. Included in this relatively small industry segment are ambulance services, blood and organ banks, and other miscellaneous ambulatory healthcare services, such as pacemaker monitoring services and smoking cessation programs.

Medical and diagnostic laboratories. Medical and diagnostic laboratories provide analytic or diagnostic services to the medical profession or directly to patients following a physician's prescription. Workers may analyze blood, take x rays and computerized tomography scans, or perform other clinical tests. Medical and diagnostic laboratories provide the fewest number of jobs in health services.

In the rapidly changing health services industry, technological advances have made many new procedures and methods of diagnosis and treatment possible. Clinical developments such as organ transplants, less invasive surgical techniques, skin grafts, and gene therapy for cancer treatment continue to increase the longevity and improve the quality of life of many Americans. Advances in medical technology also have improved the survival rates of trauma victims and the severely ill, who need extensive care from therapists and social workers, among other support personnel.

In addition, advances in information technology continue to improve patient care and worker efficiency with devices such as hand-held computers that record notes on each patient. Information on vital signs and orders for tests are transferred electronically to a main database, eliminating paper and reducing record-keeping errors.

Cost containment also is shaping the health services industry, as shown by the growing emphasis on providing services on an outpatient, ambulatory basis, limiting unnecessary or low-priority services, and stressing preventive care, which reduces the eventual cost of undiagnosed, untreated medical conditions. Enrollment in managed care programs—predominantly preferred provider organizations, health maintenance organizations, and hybrid plans such as point-of-service programs—continues to grow. These prepaid plans provide comprehensive coverage to members and control health insurance costs by emphasizing preventive care. Cost-effectiveness also is improved with the increased use of integrated delivery systems, which combine two or more segments of the industry to increase efficiency through the streamlining of functions, primarily financial and managerial. According to a 2002 Deloitte & Touche survey, only 48 percent of surveyed hospitals expect to be stand-alone, independent facilities in 2005, compared with 61 percent in 2002. These changes will continue to reshape not only the na-

ture of the health services workforce, but also the manner in which health services are provided.

Working Conditions

Average weekly hours of nonsupervisory workers in private health services varied among the different segments of the industry. Workers in home healthcare services averaged only 28.5 hours per week in 2002, while those in medical and diagnostic laboratories and other ambulatory healthcare services averaged 35.9 hours, compared with 33.9 hours for all private industry.

Many workers in the health services industry are on part-time schedules. Part-time workers made up about 16 percent of the workforce as a whole in 2002, but accounted for almost 38 percent of workers in offices of dentists and more than 21 percent of those in offices of physicians. Students, parents with young children, dual jobholders, and older workers make up much of the part-time workforce.

Many health services establishments operate around the clock and need staff at all hours. Shift work is common in some occupations, such as registered nurses. Numerous health services workers hold more than one job.

In 2002, the incidence of occupational injury and illness in hospitals was 7.4 cases per 100 full-time workers, compared with an average of 5.3 for private industry overall. Nursing care facilities and hospitals had much higher rates of 12.6 and 9.7 cases, respectively. Health services workers involved in direct patient care must take precautions to prevent back strain from lifting patients and equipment, to minimize exposure to radiation and caustic chemicals, and to guard against infectious diseases such as AIDS, tuberculosis, and hepatitis. Home care personnel who make house calls are exposed to the possibility of being injured in highway accidents, all types of overexertion when assisting patients, and falls inside and outside homes.

Employment

As the largest industry in 2002, health services provided 12.9 million jobs—12.5 million jobs for wage and salary workers and about 382,000 jobs for the self-employed. Of the 12.5 million wage and salary jobs, more than 40 percent were in hospitals; another 22 percent were in either nursing or residential care facilities; and almost 16 percent were in offices of physicians. About 92 percent of wage and salary jobs were in private industry; the rest were in State and local government hospitals. The majority of jobs for self-employed workers were in offices of physicians, dentists, and other health practitioners—about 265,000 out of the 382,000 total self-employed.

Health services jobs are found throughout the country, but are concentrated in the largest States—in particular, California, New York, Florida, Texas, and Pennsylvania.

Workers in health services tend to be older than workers in other industries. They also are more likely to remain employed in the same occupation, due, in part, to the high level of education and training required for many health occupations.

Occupations in the Industry

Health services firms employ large numbers of workers in professional and service occupations. Together, these two occupational groups account for 3 out of 4 jobs in the industry. The

next-largest share of jobs, 18 percent, is in office and administrative support. Management, business, and financial operations occupations account for only 5 percent of employment. Other occupations in health services made up only 2 percent of the total (table 2).

Professional occupations, such as *physicians and surgeons, dentists, registered nurses, social workers, and physical therapists*, usually require at least a bachelor's degree in a specialized field or higher education in a specific health field, although *registered nurses* also enter through associate degree or diploma programs. Professional workers often have high levels of responsibility and complex duties. They may supervise other workers or conduct research, as well as provide services.

Other health professionals and technicians work in many fast-growing occupations, such as *medical records and health information technicians* and *dental hygienists*. These workers may operate technical equipment and assist health diagnosing and treating practitioners. Graduates of 1- or 2-year training programs often fill such positions; the jobs usually require specific formal training beyond high school, but less than 4 years of college.

Service occupations attract many workers with little or no specialized education or training. Among these workers are *nursing aides, home health aides, building cleaning workers, dental assistants, medical assistants, and personal and home care aides*. *Nursing or home health aides* provide health-related services for ill, injured, disabled, elderly, or infirm individuals either in institutions or in their homes. By providing routine personal care services, *personal and home care aides* help elderly, disabled, and ill persons live in their own homes instead of in an institution. Although some of these workers are employed by public or private agencies, many are self-employed. With experience and, in some cases, further education and training, service workers may advance to higher level positions or transfer to new occupations.

Most jobs in health services provide clinical services, but there also are many in occupations with other functions. Numerous workers in management and administrative support jobs keep organizations running smoothly. Although many *medical and health services managers* have a background in a clinical specialty or training in health services administration, some enter these jobs with a general business education.

Each segment of the health services industry provides a different mix of wage and salary health-related jobs.

Hospitals. Hospitals employ workers with all levels of education and training, thereby providing a wider variety of services than is offered by other segments of the health services industry. About 1 in 4 hospital workers is a registered nurse. Hospitals also employ many physicians and surgeons, therapists, and social workers. About 1 in 5 jobs is in a service occupation, such as nursing, psychiatric, and home health aide, or building cleaning worker. Hospitals also employ large numbers of office and administrative support workers.

Nursing and residential care facilities. More than 3 out of 5 nursing and residential care facility jobs are in service occupations, primarily nursing, psychiatric, and home health aides. Pro-

fessional and administrative support occupations are a much smaller percentage of employment than in other parts of the health services industry. Federal law requires nursing facilities to have licensed personnel on hand 24 hours a day and to maintain an appropriate level of care.

Offices of physicians. Many of the jobs in offices of physicians are in professional and related occupations, primarily physicians and surgeons and registered nurses. A third of all jobs, however, are in office and administrative support occupations, such as receptionists and information clerks.

Offices of dentists. About a third of all jobs in this segment are in service occupations, mostly dental assistants. The typical staffing pattern in dentists' offices consists of one dentist with a support staff of dental hygienists and dental assistants. Larger practices are more likely to employ office managers and administrative support workers.

Home healthcare services. More than half of all jobs in this segment are in service occupations, mostly home health aides and personal and home care aides. Nursing and therapist jobs also account for substantial shares of employment in this segment.

Offices of other health practitioners. Professional and related occupations, including physical therapists, occupational therapists, dispensing opticians, and chiropractors, accounted for about 2 in 5 jobs in this segment. Office and administrative support occupations also accounted for a significant portion of all jobs, about 34 percent.

Outpatient care centers. This segment of the health services industry employs a high percentage of professional and related workers, including counselors, social workers, and registered nurses.

Other ambulatory healthcare services. Because this industry segment includes ambulance services, it employs almost 2 out of every 5 emergency medical technicians and paramedics and a third of all ambulance drivers and attendants.

Medical and diagnostic laboratories. Professional and related workers, primarily clinical laboratory and radiologic technologists and technicians, make up about 42 percent of all jobs in this industry segment. Service workers employed in this segment include medical assistants, medical equipment preparers, and medical transcriptionists.

Training and Advancement

A variety of programs after high school provide specialized training for jobs in health services. Students preparing for health careers can enter programs leading to a certificate or a degree at the associate, baccalaureate, professional, or graduate level. Two-year programs resulting in certificates or associate degrees are the minimum standard credential for occupations such as dental hygienist or radiologic technologist. Most therapists and social workers have at least a bachelor's degree. Health-diagnosing and -treating practitioners, such as physicians and sur-

Table 2. Employment of wage and salary workers in health services by occupation, 2002 and projected change, 2002-12 (Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	12,524	100.0	28.0
Management, business, and financial occupations	598	4.8	31.2
General and operations managers ...	81	0.6	34.1
Administrative services managers ...	32	0.3	28.4
Medical and health services managers	171	1.4	34.2
Professional and related occupations	5,453	43.5	28.8
Clinical, counseling, and school psychologists	37	0.3	37.5
Counselors	134	1.1	32.3
Social workers	146	1.2	37.6
Social and human service assistants	81	0.6	63.7
Chiropractors	19	0.2	39.5
Dentists	87	0.7	8.5
Optometrists	18	0.1	28.6
Pharmacists	60	0.5	21.1
Physicians and surgeons	418	3.3	28.8
Physician assistants	55	0.4	54.1
Podiatrists	7	0.1	24.3
Registered nurses	1,892	15.1	27.9
Occupational therapists	58	0.5	42.3
Physical therapists	117	0.9	38.3
Respiratory therapists	80	0.6	35.1
Clinical laboratory technologists and technicians	250	2.0	20.7
Dental hygienists	144	1.1	43.5
Diagnostic related technologists and technicians	254	2.0	25.3
Emergency medical technicians and paramedics	115	0.9	38.6
Health diagnosing and treating practitioner support technicians	216	1.7	20.9
Licensed practical and licensed vocational nurses	577	4.6	19.0
Medical records and health information technicians	123	1.0	51.9
Service occupations	3,930	31.4	33.7
Home health aides	407	3.3	54.5
Nursing aides, orderlies, and attendants	1,163	9.3	25.2
Occupational and physical therapist assistants and aides	103	0.8	46.5
Miscellaneous healthcare support occupations	853	6.8	45.6
Dental assistants	256	2.0	43.4
Medical assistants	330	2.6	63.2
Medical transcriptionists	83	0.7	22.2
Cooks and food preparation workers	235	1.9	8.2
Building cleaning workers	367	2.9	23.9
Personal and home care aides	266	2.1	49.1
Office and administrative support occupations	2,251	18.0	15.9
Billing and posting clerks and machine operators	170	1.4	13.7
Interviewers, except eligibility and loan	83	0.7	27.4
Receptionists and information clerks ..	342	2.7	29.9
Secretaries and administrative assistants	616	4.9	13.3
Office clerks, general	301	2.4	13.0

NOTE: May not add to totals due to omission of occupations with small employment.

geons, optometrists, and podiatrists, are among the most educated workers, with significant education and training beyond college.

The health services industry provides many job opportunities for people without specialized training beyond high school. In fact, more than half of workers in nursing and residential care facilities have a high school diploma or less, as do a quarter of workers in hospitals.

Some health services establishments provide on-the-job or classroom training, as well as continuing education. For example, in all certified nursing facilities, nursing aides must complete a State-approved training and competency evaluation program and participate in at least 12 hours of in-service education annually. Hospitals are more likely than other facilities to have the resources and incentive to provide training programs and advancement opportunities to their employees. In other segments, staffing patterns tend to be more fixed and the variety of positions and advancement opportunities more limited. Larger establishments usually offer a broader range of opportunities.

Some hospitals provide training or tuition assistance in return for a promise to work at their facility for a particular length of time after graduation. Many nursing facilities have similar programs. Some hospitals have cross-training programs that train their workers—through formal college programs, continuing education, or in-house training—to perform functions outside their specialties.

Persons considering careers in health services should have a strong desire to help others, genuine concern for the welfare of patients and clients, and an ability to deal with people of diverse backgrounds in stressful situations.

Health specialists with clinical expertise can advance to department head positions or even higher level management jobs. Medical and health services managers can advance to more responsible positions, all the way up to chief executive officer.

Earnings

Average earnings of nonsupervisory workers in health services are slightly higher than the average for all private industry, with hospital workers earning considerably more than the average and those employed in nursing and residential care facilities and home healthcare services earning less (table 3). Average earnings often are higher in hospitals because the percentage of jobs requiring higher levels of education and training is greater

Table 3. Average earnings and hours of nonsupervisory workers in health services by industry segment, 2002

Industry segment	Earnings		Weekly hours
	Weekly	Hourly	
Total, private industry	\$506	\$14.95	33.9
Health care and social assistance	495	15.33	32.3
Hospitals	638	18.63	34.3
Medical and diagnostic laboratories	614	17.11	35.9
Offices of physicians	564	17.05	33.1
Outpatient care centers	511	16.51	30.9
Other ambulatory healthcare services	489	13.62	35.9
Offices of dentists	484	17.79	27.2
Offices of other health practitioners	453	15.48	29.3
Home health care services	380	13.37	28.5
Nursing and residential care facilities	380	11.60	32.8

than in other segments. Those segments of the industry with lower earnings employ large numbers of part-time service workers.

As in most industries, professionals and managers working in health services typically earn more than other workers in the industry. Earnings in individual health services occupations vary as widely as the duties, level of education and training, and amount of responsibility required by the occupation (table 4). Some establishments offer tuition reimbursement, paid training, child daycare services, and flexible work hours. Health services establishments that must be staffed around the clock to care for patients and handle emergencies often pay premiums for overtime and weekend work, holidays, late shifts, and time spent on call. Bonuses and profit-sharing payments also may add to earnings.

Earnings vary not only by type of establishment and occupation, but also by size; salaries thus tend to be higher in larger hospitals and group practices. Geographic location also can affect earnings.

Although unionization is more common in hospitals, the health services industry is not heavily unionized. In 2002, only 11 percent of workers in the industry were members of unions or covered by union contracts, compared with about 15 percent for all industries.

Table 4. Median hourly earnings of the largest occupations in health services, 2002

Occupation	Ambulatory health care services	Hospitals, private	Nursing and residential care facilities	All industries
Registered nurses	\$21.99	\$23.64	\$20.95	\$23.12
Medical assistants	11.47	11.74	10.31	11.51
Dental assistants	13.08	13.45	-	13.10
Medical secretaries	12.34	12.02	11.35	12.23
Licensed practical and licensed vocational nurses	14.57	14.62	15.45	15.12
Home health aides	8.47	9.35	8.69	8.70
Dental hygienists	26.66	-	-	26.59
Personal and home care aides	6.75	8.47	-	7.81
Billing and posting clerks and machine operators	12.64	12.23	12.58	12.55
Office clerks, general	10.26	11.22	9.97	10.71

Outlook

Wage and salary employment in the health services industry is projected to increase 28 percent through 2012, compared with 16 percent for all industries combined (table 5). Employment growth is expected to account for about 3.5 million new wage and salary jobs—16 percent of all wage and salary jobs added to the economy over the 2002–12 period. Projected rates of employment growth for the various segments of the industry range from 12.8 percent in hospitals, the largest and slowest-growing industry segment, to 55.8 percent in the much smaller home healthcare services.

Many of the occupations projected to grow the fastest in the economy are concentrated in the health services industry. For example, over the 2002–12 period, total employment of medical assistants—including the self-employed—is projected to increase by 59 percent, physician assistants by 49 percent, home health aides by 48 percent, and medical records and health information technicians by 47 percent.

Employment in health services will continue to grow for several reasons. The number of people in older age groups, with much greater than average healthcare needs, will grow faster than the total population between 2002 and 2012, increasing the demand for health services, especially home healthcare and nursing and residential care. Advances in medical technology will continue to improve the survival rate of severely ill and injured patients, who will then need extensive therapy and care. New technologies will enable conditions not previously treatable to be identified and treated. Medical group practices and integrated health systems will become larger and more complex, increasing the need for office and administrative support workers. Also contributing to industry growth will be the shift from inpatient to less expensive outpatient care, made possible by technological improvements and consumers' increasing awareness of, and emphasis on, all aspects of health. All these factors will ensure robust growth in this massive, diverse industry.

Employment growth in the hospital segment will be the slowest within the health services industry, a result of efforts to control hospital costs and of the increasing utilization of outpatient clinics and other alternative care sites. Hospitals will

streamline health services delivery operations, provide more outpatient care, and rely less on inpatient care. Job opportunities, however, will remain plentiful because hospitals employ a large number of people. Besides job openings due to employment growth, additional openings will arise as workers leave the labor force or transfer to other occupations. Occupations with the most replacement openings are usually large, with high turnover stemming from low pay and status, poor benefits, low training requirements, and a high proportion of young and part-time workers, such as nursing, psychiatric, and home health aides. By contrast, occupations with relatively few replacement openings (such as physicians and surgeons) are characterized by high pay and status, lengthy training requirements, and a high proportion of full-time workers.

Fast growth is expected for workers in occupations concentrated outside the inpatient hospital sector, such as medical assistants and home health aides. Because of cost pressures, many health services facilities will adjust their staffing patterns to reduce labor costs. Where patient care demands and regulations allow, health services facilities will substitute lower paid providers and will cross-train their workforces. Many facilities have cut the number of middle managers, while simultaneously creating new managerial positions as they diversify. Because traditional inpatient hospital positions are no longer the only option for many future health services workers, persons seeking a career in the field must be willing to work in various employment settings.

Demand for dental care will rise due to population growth, greater retention of natural teeth by middle-aged and older persons, greater awareness of the importance of dental care, and an increased ability to pay for services. Dentists will use support personnel such as dental hygienists and assistants to help meet their increased workloads.

In some management, business, and financial operations occupations, rapid growth will be tempered by restructuring to reduce administrative costs and streamline operations. The effects of office automation and other technological changes will slow employment growth in office and administrative support occupations, but because the employment base is large, replacement needs will continue to create substantial numbers of job openings. Slower growing service occupations also will provide job openings due to replacement needs.

Technological changes, such as increased laboratory automation, will negatively affect the demand for other occupations as well. For example, the use of robotics in blood analysis may limit job growth for medical and clinical laboratory technologists and technicians, although the hands-on nature of health services precludes significant productivity gains in many instances.

Health services workers at all levels of education and training will continue to be in demand. In many cases, it may be easier for jobseekers with health-specific training to obtain jobs and advance in their careers. Specialized clinical training is a requirement for many jobs in health services and is an asset even for many administrative jobs that do not specifically require it.

Table 5. Employment of wage and salary workers in health services by industry segment, 2002 and projected change 2002-12
(Employment in thousands)

Industry segment	Employment, 2002	Percent change, 2002-12
All industries	132,279	16.3
Health services	12,524	28.0
Hospitals, public and private	5,148	12.8
Nursing and residential care facilities	2,743	34.3
Offices of physicians	1,983	38.8
Offices of dentists	726	30.9
Home healthcare services	675	55.8
Offices of other health practitioners	482	48.8
Other ambulatory healthcare services	184	47.5
Medical and diagnostic laboratories	174	37.6

Sources of Additional Information

For referrals to hospital human resource departments about local opportunities in health services, contact:

- American Hospital Association/American Society for Healthcare Human Resources Administration, One North Franklin, Chicago, IL 60606.

For additional information on specific health-related occupations, contact:

- American Medical Association/Health Professions Career and Education Directory, 515 N. State St., Chicago, IL 60610. Internet: <http://www.ama-assn.org/go/alliedhealth>

A wealth of information on health careers and job opportunities also is available through the Internet, schools, libraries, associations, and employers.

Information on the following occupations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Audiologists
- Cardiovascular technologists and technicians
- Chiropractors
- Clinical laboratory technologists and technicians
- Dental assistants
- Dental hygienists
- Dentists
- Diagnostic medical sonographers
- Dietitians and nutritionists
- Emergency medical technicians and paramedics
- Licensed practical and licensed vocational nurses
- Medical and health services managers

- Medical assistants
- Medical records and health information technicians
- Medical secretaries
- Medical transcriptionists
- Nuclear medicine technologists
- Nursing, psychiatric, and home health aides
- Occupational therapist assistants and aides
- Occupational therapists
- Ophthalmic laboratory technicians
- Opticians, dispensing
- Optometrists
- Personal and home care aides
- Pharmacists
- Pharmacy aides
- Pharmacy technicians
- Physical therapist assistants and aides
- Physical therapists
- Physician assistants
- Physicians and surgeons
- Podiatrists
- Psychologists
- Radiologic technologists and technicians
- Receptionists and information clerks
- Recreational therapists
- Registered nurses
- Respiratory therapists
- Social and human service assistants
- Social workers
- Speech-language pathologists
- Surgical technologists
- Veterinarians

Social Assistance, Except Child Daycare

(NAICS 624, except 6244)

SIGNIFICANT POINTS

- About 2 out of 3 jobs are in professional and service occupations.
- Job opportunities in social assistance should be numerous through the year 2012.
- Average earnings are low because of the large number of part-time and low-paying service jobs.

Nature of the Industry

Careers in social assistance appeal to persons with a strong desire to make life better and easier for others. Workers in this industry usually are good communicators and enjoy interacting with people. Social assistance establishments provide a wide array of services that include helping the homeless, counseling troubled and emotionally disturbed individuals, training the unemployed or underemployed, and helping the needy to obtain financial assistance. About 55,000 establishments in the private sector provided social assistance in 2002. Thousands of other establishments, mainly in State and local government, provided additional social assistance. (For information about government social assistance, see the *Career Guide* statements on Federal Government, and State and local government, excluding education and hospitals.)

Social assistance consists of four segments—individual and family services; community food and housing, and emergency and other relief services; vocational rehabilitation services; and child daycare services. The child daycare services segment, including daycare and preschool care centers, is covered in a separate *Career Guide* statement.

Individual and family services establishments are primarily engaged in providing nonresidential social assistance for children, the elderly, or persons with mental or physical disabilities. Services provided for children may include adoption and foster care, drug prevention, life skills training, and positive social development. Services also are provided to the elderly and persons with disabilities through adult daycare, nonmedical home care or homemaker services, social activities, group support, and companionship.

Community food and housing, and emergency and other relief services establishments provide various types of assistance to members of the community. Community food and housing, and emergency and other relief services is further divided into three sectors: Community food services, community housing services, and emergency and other relief services.

Establishments in the *community food services* subsector collect, prepare, and deliver food for the needy. Establishments in this industry may also distribute clothing and blankets to the poor. These establishments may prepare and deliver meals to persons who by reason of age, disability, or illness are unable to prepare meals for themselves; collect and distribute salvageable or donated food; or prepare and provide meals at fixed or mobile locations. Food banks, meal delivery programs, and soup kitchens are included in this industry.

Establishments in the *community housing services* sector provide short-term emergency shelter for victims of domestic violence, sexual assault, or child abuse. Also included in this sector are establishments that provide transitional housing for low-income individuals and families as well as temporary residential shelter for the homeless, runaway youths, and patients and families caught in medical crises. Community housing establishments also perform volunteer construction or repair of low-cost housing, in partnership with the homeowner who may assist in construction or repair work and repair of homes for elderly or disabled homeowners. These establishments may operate their own shelter or may provide subsidized housing using existing homes.

Establishments in the *emergency and other relief services* sector provide food, shelter, clothing, medical relief, resettlement, and counseling to victims of domestic or international disasters or conflicts.

Vocational rehabilitation services establishments provide vocational rehabilitation or life skills services, such as job counseling, job training, and work experience, to unemployed and underemployed persons, persons with disabilities, and persons who have a job market disadvantage because of lack of education, job skills, or experience. Vocational rehabilitation job training facilities and sheltered workshops, such as work experience centers, are included in this industry.

Working Conditions

Some social assistance establishments operate around the clock. Thus, evening, weekend, and holiday work is common. Some establishments may be understaffed, resulting in large caseloads for each worker. Jobs in voluntary, nonprofit agencies often are part time.

Some workers spend a substantial amount of time traveling within the local area. For example, home health and personal care aides routinely visit clients in their homes; social workers and social and human service assistants also may make home visits. In 2002, the incidence rate for occupational injury and illness in social assistance varied by industry sector. Compared with the rate of 5.3 per 100 full-time workers for the entire private sector, individual and family services had a rate of 4.5 and other social services had a rate of 3.7.

Employment

Social assistance provided 1.3 million nongovernment wage and salary jobs in 2002. About 60 percent were in individual and family services (table 1).

Table 1. Employment of nongovernment wage and salary workers in social assistance, except child day care, by detailed industry, 2002
(Employment in thousands)

Industry segment	2002 employment		2002-2012 percent change
	Number	Percent	
Total, social services, except childcare	1,269.3	100.0	45.6
Individual and family services	767.4	60.5	45.6
Vocational rehabilitation services	376.3	29.6	49.5
Community food and housing, and emergency and other relief services	125.6	9.9	49.0

In 2002, about 73 percent of social assistance establishments employed fewer than 20 workers; however, larger establishments accounted for most jobs (see chart).

Social assistance workers were somewhat older than workers in other industries (table 2). About 43 percent were 45 years old or older, compared with 38 percent of all workers. Jobs in social assistance are concentrated in large States with heavily populated urban areas, such as New York and California.

Table 2. Percent distribution of employment in social assistance, except child day care, by age group, 2002

Age group	Social services	All industries
Total	100.0	100.0
16 to 24	10.5	14.7
25 to 34	23.1	21.6
35 to 44	23.8	26.3
45 to 54	24.6	22.9
55 to 64	13.6	11.4
65 and older	4.4	3.2

Occupations in the Industry

More than one-third of nongovernment social assistance jobs are in professional and related occupations (table 3). *Social workers* counsel and assess the needs of clients, refer them to the appropriate sources of help, and monitor their progress. They may specialize in child welfare and family services, mental health, medical social work, school social work, community organization activities, or clinical social work. *Social and human service assistants* work in a variety of social and human service delivery settings. Job titles and duties of these workers vary, but they include human service worker, case management aide, social work assistant, mental health aide, child abuse worker, community outreach worker, and gerontology aide. *Counselors* help people evaluate their interests and abilities, and advise and assist them with personal and social problems.

Almost one-third of employment in the social assistance industry is in many of the service occupations. *Personal and home care aides* help elderly, disabled, and ill persons live in their own homes, instead of in an institution, by providing routine personal care services. Although some are employed by public or private agencies, many are self-employed. Persons in *food preparation and serving related occupations* serve residents at social assistance institutions. *Home health aides*

provide health-related services for ill, injured, disabled, or elderly individuals in their homes.

As in most industries, office and administrative support workers—secretaries and bookkeepers, for example—as well as managers account for many jobs. However, social assistance employs a much smaller percentage of production; installation, maintenance, and repair; and sales jobs than does the economy as a whole.

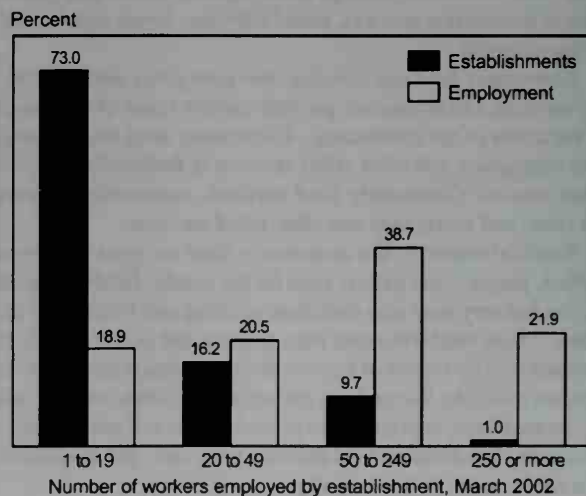
Certain occupations are more heavily concentrated in some segments of the industry than in others. Individual and family services, for example, employs the greatest numbers of social workers, social and human service assistants, and personal and home care aides. Vocational rehabilitation services provides the most jobs for adult literacy and remedial and self-enrichment education teachers.

Training and Advancement

Some occupations in social assistance have very specific entrance requirements. These include most of the professional and related occupations. Those requiring specific clinical training, such as clinical social workers and clinical psychologists, also require appropriate State licensure or certification. Nevertheless, people with a limited background in social assistance or little education beyond high school can find a job in the industry. Nursing aides, orderlies, and attendants; home health aides; and personal and home care aides are some of these occupations. Many establishments provide on-the-job or classroom training, especially for those with limited background or training.

Many employers prefer social and human service assistants with some related work experience or college courses in human services, social work, or one of the social or behavioral sciences. Other employers prefer an associate degree or a bachelor's degree in human services or social work. A number of employers provide in-service training, such as seminars and workshops.

Most establishments in social assistance, except child daycare, have fewer than 20 employees, but most jobs are in larger establishments



Entry-level jobs for social workers require a bachelor's degree in social work or in an undergraduate major such as psychology or sociology. However, most agencies require a master's degree in social work or a closely related field. Public agencies and private practice clinics that offer clinical or consultative services

Table 3. Employment of wage and salary workers in social assistance, except child day care, by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Industry segment	2002 employment		2002-2012 percent change
	Number	Percent	
All occupations	1,269	100.0	47.1
Management, business, and financial occupations	145	11.4	46.6
Top executives	31	2.4	43.0
Operations specialties managers	18	1.4	47.3
Social and community service managers	31	2.4	45.2
Human resources, training, and labor relations specialists	20	1.6	49.2
Professional and related occupations	443	34.9	53.4
Substance abuse and behavioral disorder counselors	13	1.0	38.0
Educational, vocational, and school counselors	19	1.5	41.0
Mental health counselors	17	1.3	43.1
Rehabilitation counselors	45	3.5	50.5
Social workers	81	6.4	48.0
Social and human service assistants ..	88	6.9	78.9
Primary, secondary, and special education teachers	22	1.7	37.6
Other teachers and instructors	23	1.8	57.5
Teacher assistants	21	1.6	40.0
Registered nurses	14	1.1	44.4
Service occupations	391	30.8	51.5
Home health aides	79	6.2	40.4
Cooks and food preparation workers ...	19	1.5	30.8
Janitors and cleaners, except maids and housekeeping cleaners ...	27	2.1	44.0
Child care workers	24	1.9	43.6
Personal and home care aides	146	11.5	67.8
Recreation workers	16	1.3	43.2
Sales and related occupations	18	1.4	43.2
Office and administrative support occupations	164	12.9	25.2
Bookkeeping, accounting, and auditing clerks	17	1.3	24.5
Receptionists and information clerks ..	17	1.3	45.2
Secretaries and administrative assistants	44	3.5	19.4
Office clerks, general	34	2.7	27.8
Production occupations	34	2.7	42.4
Transportation and material moving occupations	62	4.9	35.9
Motor vehicle operators	31	2.4	38.4
Laborers and freight, stock, and material movers, hand	21	1.7	27.2

NOTE: May not add to totals due to omission of occupations with small employment.

require an advanced degree in clinical social work; supervisory, administrative, and staff training positions usually require at least a master's degree.

Volunteering with a student, religious, or charitable organization is a good way for persons to test their interest in social assistance, and may provide an advantage when applying for jobs in this industry.

Advancement paths vary. For example, some personal and home care aides as well as some nursing aides, orderlies, and attendants, and home health aides get additional training and become licensed practical nurses. Formal education—usually a bachelor's or master's degree in counseling, human services, rehabilitation, social work, or a related field—almost always is necessary in order for social and human service assistants to advance. Social workers with an advanced degree and the appropriate license can advance to supervisor, program manager, assistant director, or executive director of an agency or department. They also may enter private practice and provide psychotherapeutic counseling and other services on a contract basis.

Earnings

Earnings in selected occupations in the social assistance, except child daycare industry in 2002 appear in table 4. As in most industries, professionals and managers—whose salaries reflect higher education levels, broader experience, and greater responsibility—commonly earn more than other workers.

Average earnings in the social assistance industry are lower than the average for all industries, as shown in table 5.

About 15 percent of workers in the social assistance industry were union members or were covered by union contracts in 2002, about the same as workers throughout all industries.

Outlook

Job opportunities in social assistance should be numerous through the year 2012. The number of nongovernment wage and salary jobs is expected to increase 47 percent, compared with only 16 percent for all industries combined. Expected growth rates for the various segments of the industry are 46 percent in individual and family services, 49 percent in vocational rehabilitation services, and 49 percent in community food and housing, and emergency and other relief services over the 2002-12 period. In addition to those arising from employment growth, many job openings will stem from the need to replace workers who transfer to other occupations or stop working.

Projected job growth is due mostly to the expansion of services for the elderly and the aging baby-boom generation. Similarly, services for the mentally ill, the physically disabled, and families in crisis will be expanded. Increasing emphasis on providing home care services rather than more costly nursing home or hospital care, and on earlier and better integration of the physically disabled and mentally ill into society, also will contribute to employment growth in the social assistance industry, as will increased demand for drug and alcohol abuse prevention programs. Employment in private social service agencies may be spurred as State and local governments contract out their social services in an effort to cut costs. The expan-

Table 4. Median hourly earnings of the largest occupations in social assistance, except child day care, 2002

Occupation	Individual and family services	Community food and housing and emergency and other relief services	Vocational rehabilitation services	All Industries
Registered nurses	\$20.54	—	\$21.88	\$23.12
Mental health and substance abuse social workers	15.05	13.30	—	15.79
Child, family, and school social workers	14.02	12.89	13.63	15.94
Substance abuse and behavioral disorder counselors	13.64	13.73	—	14.51
All other counselors, social and religious workers	13.14	11.94	12.50	14.98
Rehabilitation counselors	11.88	12.03	11.89	12.43
Social and human service assistants	10.68	10.50	10.23	11.24
Preschool teachers, except special education	9.99	—	9.09	9.26
Personal and home care aides	8.12	8.07	8.40	7.81
Janitors and cleaners, except maids and housekeeping cleaners	7.80	8.39	7.66	8.77

sion and creation of employment in the social assistance industry may depend, in large part, on the amount of funding made available by the government and managed-care organizations.

Some of the fastest growing occupations in the Nation are concentrated in social assistance. Compared with industry growth of 47 percent, the number of home health aides within social assistance is projected to grow 40 percent between 2002 and 2012. The number of social and human service assistants is expected to grow 79 percent, and that of personal and home care aides 68 percent. Overall employment of social workers will continue to grow, but not as rapidly as that of social and human service assistants.

Table 5. Average earnings of nonsupervisory workers in social assistance, 2002

Industry segment	Weekly	Hourly
All private industry	\$506	\$14.95
Social assistance	319	10.54
Community housing, emergency, and relief services	383	12.06
Individual and family services	354	11.43
Vocational rehabilitation services	305	10.34
Community food services	302	10.62

Sources of Additional Information

For information about careers in social work and voluntary credentials for social workers, contact:

- National Association of Social Workers, 750 First St. NE., Suite 700, Washington, DC 20002-4241.
Internet: <http://www.socialworkers.org>

For information on programs and careers in human services, contact:

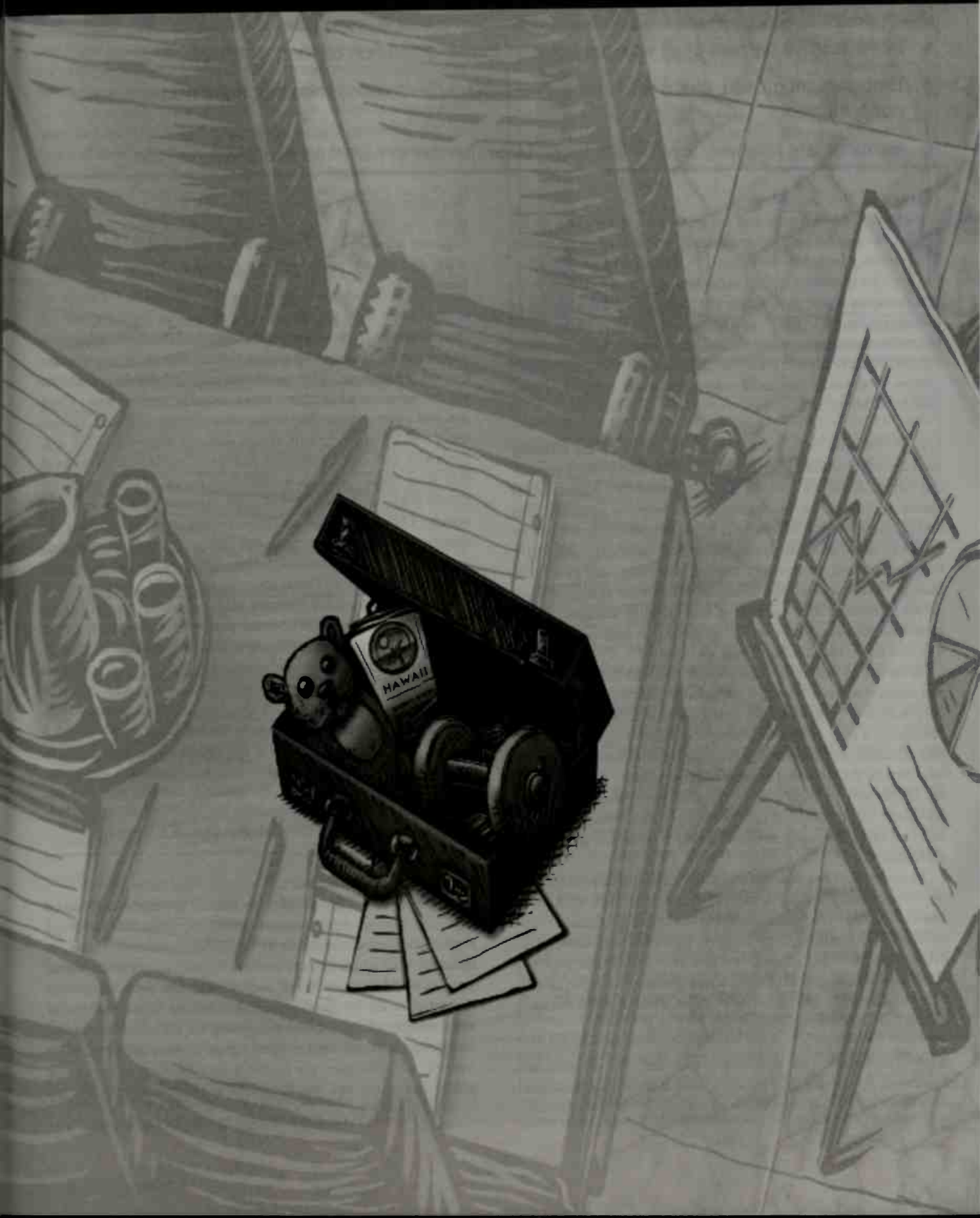
- Council for Standards in Human Services Education, Harrisburg Area Community College, Human Services Program, One HACC Dr., Harrisburg, PA 17110-2999.
Internet: <http://www.cshse.org>

State employment service offices also may be able to provide information on job opportunities in social assistance.

Information on many occupations in social assistance, including the following, may be found in the 2004-05 *Occupational Outlook Handbook*:

- Counselors
- Nursing, psychiatric, and home health aides
- Personal and home care aides
- Social and human service assistants
- Social workers
- Teachers—adult literacy and remedial and self-enrichment education

Leisure and Hospitality



Arts, Entertainment, and Recreation

(NAICS 71)

SIGNIFICANT POINTS

- More than 40 percent of all workers have no formal education beyond high school.
- Employment growth, along with substantial replacement needs, should create numerous job opportunities.
- Earnings are relatively low, reflecting the large number of part-time and seasonal jobs.

Nature of the Industry

As leisure time and personal incomes have grown across the Nation, so has the arts, entertainment, and recreation industry. This industry includes more than 108,000 establishments, ranging from art museums to fitness centers. Practically any activity that occupies a person's leisure time, excluding the viewing of motion pictures and videotape rentals, is part of the arts, entertainment, and recreation industry. The diverse range of activities offered by this industry can be categorized into three broad groups—live performances or events; historical, cultural, or educational exhibits; and recreation or leisure-time facilities.

Live performances or events. This segment of the industry includes professional sports, as well as establishments providing *sports* facilities and services to amateurs. Commercial sports clubs operate professional and amateur athletic clubs and promote athletic events. All kinds of popular sports can be found in these establishments, including baseball, basketball, boxing, football, ice hockey, soccer, wrestling, and even auto racing. Professional and amateur companies involved with sports promotion also are part of this industry segment, as are sports establishments in which gambling is allowed, such as dog and horse racetracks and jai alai courts.

A variety of businesses and groups involved in live theatrical and musical performances are included in this segment. Theatrical production companies, for example, coordinate all aspects of producing a play or theater event, including employing actors and actresses, costume designers, and lighting and stage crews who handle the technical aspects of productions. Also included are agents and managers, who represent actors and entertainers and assist them in finding jobs or engagements. Booking agencies line up performance engagements for theatrical groups and entertainers.

Performers of live musical entertainment include popular music artists, dance bands, orchestras, jazz musicians, and rock-and-roll bands. Orchestras range from major professional orchestras with million dollar budgets to community orchestras, often with part-time schedules. The performing arts segment also includes dance companies, which produce all types of live theatrical dances. The majority of these dance troupes perform ballet, folk dance, or modern dance.

Historical, cultural, or educational exhibits. Privately owned museums, zoos, botanical gardens, nature parks, and historical sites make up this segment of the industry; publicly owned facili-

ties are included in sections on Federal, State, or local government elsewhere in the *Career Guide*. Each institution in this segment engages in the preservation and exhibition of objects, sites, and natural wonders with historical, cultural, or educational value.

Recreation or leisure time. A variety of establishments provide amusement for a growing number of customers. Some of these businesses provide video game, pinball, and gaming machines for the public at amusement parks, arcades, and casinos. Casinos and other gaming establishments offering off-track betting are a rapidly growing part of this industry segment. This segment also includes amusement and theme parks, which range in size from local carnivals to multiacre parks. These establishments may have mechanical rides, shows, and refreshment stands. Other recreation and leisure-time services include golf, skating rinks, ski lifts, marinas, day camps, fireworks display services, gocart rentals, rodeos, riding stables, waterslides, and establishments offering rental sporting goods.

This segment of the industry also includes physical fitness facilities that feature exercise and weight loss programs, gyms, health clubs, and day spas. These establishments also frequently offer aerobic dance, yoga, and exercise classes. Other recreation and leisure-time businesses include bowling centers that rent lanes and equipment for tenpin, duckpin, or candlepin bowling.

These facilities may be open to the public or available on a membership basis. Sports and recreation clubs open only to members and their guests include some golf courses and country clubs, and yacht, tennis, racquetball, hunting and fishing, and gun clubs. Public golf courses and marinas, unlike private clubs, offer facilities to the general public on a fee basis.

Working Conditions

Jobs in arts, entertainment, and recreation are more likely to be part time than are those in other industries. In fact, the average nonsupervisory worker in the arts, entertainment, and recreation industry worked 25.7 hours a week in 2002, as compared to an average of 33.9 hours for all private industry. Musical groups and artists were inclined to work the fewest hours, due to the large number of performers competing for a limited number of engagements which may require a great amount of travel. The majority of performers are unable to support themselves in this profession alone and are forced to supplement their income through other jobs.

Many types of arts, entertainment, and recreation establishments dramatically increase employment during the summer and either scale back employment during the winter or close down completely. Workers may be required to work nights, weekends, and holidays because that is when most establishments are busiest. Some jobs require extensive travel. Music and dance troupes, for example, frequently tour or travel to major metropolitan areas across the country, in hopes of attracting large audiences.

Many in this industry work outdoors, whereas others may work in hot, crowded, or noisy conditions. Some jobs, such as those at fitness facilities or in amusement parks, involve some manual labor and, thus, require physical strength and stamina. Also, athletes, dancers, and many other performers must be in particularly good physical condition. Many jobs include customer-service responsibilities, so employees must be able to work well with the public.

In 2002, cases of work-related illness and injury averaged 6.3 for every 100 full-time workers, higher than the average of 5.3 for the entire private sector. Risks of injury are high in some jobs, especially those of athletes. Although most injuries are minor, including sprains and muscle pulls, they may prevent an employee from working for a period.

Employment

The arts, entertainment, and recreation industry provided about 1.8 million wage and salary jobs in 2002. Over half of these jobs were in the industry segment *other amusement and recreation industries*—which includes golf courses, membership sports and recreation clubs, and physical fitness facilities (table 1).

Table 1. Employment in arts, entertainment, and recreation by industry segment, 2002
(Employment in thousands)

Industry segment	Employment
Arts, entertainment, and recreation, total	1,778
Other amusement and recreation industries	1,017
Amusement parks and arcades	154
Gambling industries	137
Performing arts companies	118
Spectator sports	118
Museums, historical sites, and other institutions	113
Promoters of performing arts, sports, and similar events	67
Independent artists, writers, and performers	40
Agents and managers for artists, athletes, entertainers, and other public figures	15

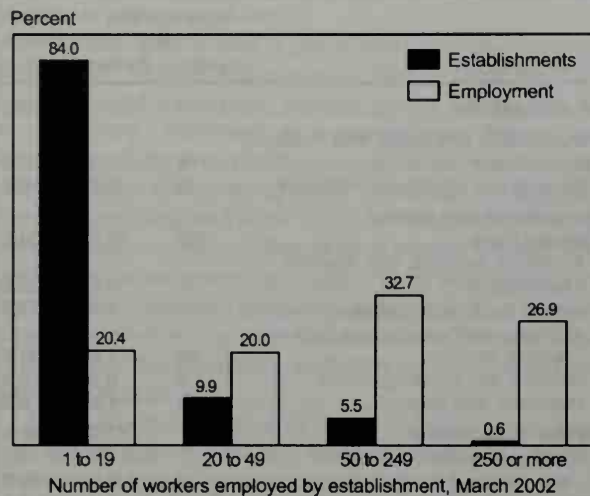
Although most establishments in the arts, entertainment, and recreation industry are small, over half of all jobs were in establishments that employ more than 50 workers (chart).

The arts, entertainment, and recreation industry is characterized by a large number of seasonal and part-time positions and by workers who are younger than the average for all industries. Nearly half of all workers are under the age of 35. Many businesses in the industry increase hiring during the summer, often employing high school- and college-age workers.

Occupations in the Industry

About 57 percent of wage and salary workers in the industry are employed in service occupations (table 2). *Amusement and rec-*

More than half of all jobs in arts, entertainment, and recreation are in establishments that employ more than 50 workers



recreation attendants—the largest occupation in the arts, entertainment, and recreation industry—perform a variety of duties depending on where they are employed. Common duties include setting up games, handing out sports equipment, providing caddy services for golfers, collecting money, and operating amusement park rides.

Fitness trainers and aerobics instructors lead or coach groups or individuals in exercise activities and in the fundamentals of sports.

Recreation workers organize and promote activities such as arts and crafts, sports, games, music, dramatics, social recreation, camping, and hobbies. They generally are employed by schools; theme parks and other tourist attractions; or health, sports, and other recreational clubs. Recreation workers schedule organized events to structure leisure time.

Gaming services workers assist in the operation of games such as keno, bingo, and gaming table games. They may calculate and pay off the amount of winnings, or collect players' money or chips.

Tour and travel guides escort individuals or groups on sightseeing tours or through places of interest, such as industrial establishments, public buildings, and art galleries. They may also plan, organize, and conduct long-distance cruises, tours, and expeditions for individuals or groups.

Animal care and service workers feed, water, bathe, exercise, or otherwise care for animals in zoos, circuses, aquariums, or other settings. They may train animals for riding or performance.

Building grounds, cleaning, and maintenance occupations include *building cleaning workers*, who clean up after shows or sporting events and are responsible for the daily cleaning and upkeep of facilities. *Landscaping and groundskeeping workers* care for athletic fields and golf courses. These workers maintain artificial and natural turf fields, mark boundaries, and paint team logos. They also mow, water, and fertilize natural athletic fields and vacuum and disinfect synthetic fields. Establishments in this industry also employ workers in protective service occupa-

Table 2. Employment of wage and salary workers in arts, entertainment, and recreation by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,778	100.0	28.0
Management, business, and financial occupations	112	6.3	29.5
General and operations managers	38	2.2	28.9
Professional and related occupations	196	11.0	24.2
Archivists, curators, and museum technicians	8	0.5	26.2
Actors, producers, and directors	25	1.4	17.9
Athletes, coaches, umpires, and related workers	32	1.8	31.9
Dancers and choreographers	9	0.5	16.4
Musicians and singers	32	1.8	8.8
Service occupations	1,017	57.2	30.5
Gaming surveillance officers and gaming investigators	3	0.2	34.7
Security guards	39	2.2	17.1
Cooks and food preparation workers	60	3.4	22.4
Bartenders	39	2.2	16.3
Fast food and counter workers	60	3.4	32.7
Waiters and waitresses	93	5.2	23.5
Building cleaning workers	61	3.4	23.0
Landscaping and groundskeeping workers	112	6.3	33.4
Supervisors, personal care and service workers	26	1.5	33.9
Animal care and service workers	13	0.7	28.4
Gaming services workers	28	1.6	34.7
Ushers, lobby attendants, and ticket takers	31	1.8	11.1
Amusement and recreation attendants	147	8.3	33.9
Tour and travel guides	14	0.8	28.1
Child care workers	25	1.4	35.2
Fitness trainers and aerobics instructors	94	5.3	62.1
Recreation workers	19	1.1	33.7
Sales and related occupations	154	8.7	27.4
Cashiers, except gaming	63	3.6	24.5
Gaming change persons and booth cashiers	12	0.7	34.8
Counter and rental clerks	25	1.4	34.8
Office and administrative support occupations	165	9.3	17.0
Gaming cage workers	8	0.4	20.4
Receptionists and information clerks	35	2.0	34.0
Secretaries and administrative assistants	29	1.6	7.1
Office clerks, general	29	1.6	14.0
Installation, maintenance, and repair occupations	66	3.7	33.0
Maintenance and repair workers, general	36	2.0	33.4
Transportation and material moving occupations	44	2.5	15.9
Laborers and freight, stock, and material movers, hand	21	1.2	8.0

NOTE: May not add to totals due to omission of occupations with small employment.

tions. *Security guards* patrol the property and guard against theft, vandalism, and illegal entry. At sporting events, guards maintain order and direct patrons to various facilities. *Gaming surveillance officers* and *gaming investigators* observe casino operations to detect cheating, theft, or other irregular activities by patrons or employees.

Other service workers include *waiters and waitresses*, who serve food in entertainment establishments; *fast food and counter workers* and *cooks and food preparation workers*, who may serve or prepare food for patrons; and *bartenders*, who mix and serve drinks in arts, entertainment, and recreation establishments.

Professional and related occupations account for 11 percent of all jobs in this industry. Members of one of the most well-known, *athletes and sports competitors*, perform in a variety of sports. Professional athletes compete in events for compensation, either through salaries or prize money. Organizations such as the Women's National Basketball Association (WNBA) and the National Football League (NFL) sanction events for professionals. Few athletes are able to make it to the professional level, where high salaries are common. In some professional sports, minor leagues offer lower salaries with a chance to develop skills through competition before advancing to major league play.

Coaches and scouts train athletes to perform at their highest level. Often, they are experienced athletes who have retired and are able to provide insight from their own experiences to players. Although some *umpires, referees, and other sports officials* work full time, even in professional sports the majority usually work part time and often have other full-time jobs. For example, many professional sport referees and umpires officiate at amateur games, as well.

Musicians and singers may play musical instruments, sing, compose, arrange music, or conduct groups in instrumental or vocal performances. The specific skills and responsibilities of musicians vary widely by type of instrument, size of ensemble, and style of music. For example, musicians can play jazz, classical, or popular music, either alone or in groups ranging from small rock bands to large symphony orchestras.

Actors entertain and communicate with people through their interpretation of dramatic and other roles. They can belong to a variety of performing groups, ranging from those appearing in community and local dinner theaters to those playing in full-scale Broadway productions. *Dancers* express ideas, stories, rhythm, and sound with their bodies through different types of dance, including ballet, modern dance, tap, folk, and jazz. Dancers usually perform in a troupe, although some perform solo. Many become teachers when their performing careers end. *Choreographers* create and teach dance, and they may be called upon to direct and stage presentations. *Producers and directors* select and interpret plays or scripts, and give directions to actors and dancers. They conduct rehearsals, audition cast members, and approve choreography. They also arrange financing, hire production staff members, and negotiate contracts with personnel.

Archivists, curators, and museum technicians play an important role in preparing museums for display. Archivists appraise, edit, and direct safekeeping of permanent records and historically valuable documents. They may also participate in research activities based on archival materials. Curators administer a museum's affairs and conduct research programs.

Museum technicians and conservators prepare specimens, such as fossils, skeletal parts, lace, and textiles, for museum collection and exhibits. They may also take part in restoring documents or installing and arranging materials for exhibit.

About 9 percent of all jobs in this industry are in sales and related occupations. The largest of these, cashiers, often use a cash register to receive money and give change to customers. In casinos, *gaming change persons* and *booth cashiers* exchange coins and tokens for patrons' money. *Counter and rental clerks* check out rental equipment to customers, receive orders for service, and handle cash transactions.

Another 9 percent of jobs in this industry are in office and administrative support occupations. *Receptionists and information clerks*, one of the larger occupations in this category, answer questions and provide general information to patrons. Other large occupations in this group include *general office clerks* and *secretaries and administrative assistants*. *Gaming cage workers* conduct financial transactions for patrons in gaming establishments. For example, they may accept a patron's credit application and verify credit references to provide check-cashing authorizations or to establish house credit accounts. Also, they may reconcile daily summaries of transactions to balance books or sell gambling chips, tokens, or tickets to patrons. At a patron's request, gaming cage workers may convert gaming chips, tokens, or tickets to currency.

Management, business, and financial occupations make up 6 percent of employment in this industry. Managerial duties in the performing arts include marketing, business management, event booking, fundraising, and public outreach. *Recreation supervisors* and *park superintendents* oversee personnel, budgets, grounds and facility maintenance, and land and wildlife resources. Some common administrative jobs in sports are *tournament director*, *health club manager*, and *sports program director*.

Installation, maintenance, and repair occupations make up 4 percent of industry employment. *General maintenance and repair workers* are the largest occupation in this group.

Training and Advancement

More than 40 percent of all workers in the arts, entertainment, and recreation industry have no formal education beyond high school. In the case of performing artists or athletes, talent and years of training are more important than education. However, upper level management jobs usually require a college degree.

Most service jobs require little or no previous training or education beyond high school. Many companies hire young, unskilled workers, such as students, to perform low-paying, seasonal jobs. Amusement parks prefer workers who are at least 17 years old. Employers look for people with the interpersonal skills necessary to work with the public.

In physical fitness facilities, fitness trainer and aerobic instructor positions usually are filled by persons who develop an avid interest in fitness and then become certified to teach. Certification from a professional organization may require knowledge of cardiopulmonary resuscitation (CPR); experience as an instructor at a health club; and successful completion of written and oral exams covering a variety of areas, including anatomy,

nutrition, and fitness testing. Sometimes, fitness workers become health club managers or owners. To advance to a management position, a degree in physical education, sports medicine, or exercise physiology is useful.

In the arts, employment in professional and related occupations usually requires a great deal of talent. There are many highly talented performers, creating intense competition for every opening. Performers such as musicians, dancers, and actors often study their professions most of their lives, taking private lessons and spending hours practicing. Usually, performers have completed some college or related study. Musicians, dancers, and actors often go on to become teachers after completing the necessary requirements for at least a bachelor's degree. Musicians who complete a graduate degree in music sometimes move on to a career as a conductor. Dancers sometimes become choreographers, and actors can advance into producer and director jobs.

Almost all arts administrators have completed 4 years of college, and the majority possess a master's degree or a doctorate. Experience in marketing and business is helpful because promoting events is a large part of the job.

Entry-level supervisory or professional jobs in recreation sometimes require completion of a 2-year associate degree in parks and recreation at a junior college. Completing a 4-year bachelor's degree in this field is necessary for high-level supervisory positions. Students can specialize in such areas as aquatics, therapeutic recreation, aging and leisure, and environmental studies. Those who obtain graduate degrees in the field and have years of experience usually can obtain administrative or university teaching positions. The National Recreation and Parks Association (NRPA) certifies individuals who meet eligibility requirements for professional and technical jobs. Certified Park and Recreation Professionals must pass an exam; earn a bachelor's degree with a major in recreation, park resources, or leisure services from an NRPA/American Association for Leisure and Recreation accredited program; or earn a bachelor's degree and have either 2 or 5 years of relevant full-time work experience, depending on the bachelor's degree chosen.

Earnings

Earnings in arts, entertainment, and recreation generally are low, reflecting the large number of part-time and seasonal jobs. Nonsupervisory workers in arts, entertainment, and recreation averaged \$301 a week in 2002, compared with \$506 throughout private industry.

Earnings vary according to occupation and segment of the industry. For example, some professional athletes earn millions, but competition for these positions is intense, and most athletes are unable to reach even the minor leagues. Many service workers make the minimum wage or a little more. Actors often go long periods with little or no income from acting, so they are forced to work at second jobs. Earnings in selected occupations in arts, entertainment, and recreation appear in table 3.

Because many amusement and theme parks dramatically increase employment during vacation periods, employment for a number of jobs in the industry is seasonal. Theme parks, for

Table 3. Median hourly earnings of the largest occupations in arts, entertainment, and recreation, 2002

Occupation	Amusement, gambling, and recreation industries	Performing arts, spectator sports, and related industries	Museums, historical sites, and similar institutions	All industries
Executive secretaries and administrative assistants	\$13.96	\$15.02	\$14.88	\$16.06
Maintenance and repair workers, general	10.45	11.63	12.30	14.12
Security guards	9.22	9.52	10.56	9.20
Janitors and cleaners, except maids and housekeeping cleaners	8.04	8.44	8.89	8.77
Cooks, short order	7.83	—	—	7.82
Cashiers	7.41	8.30	7.76	7.41
Counter and rental clerks	7.31	—	—	8.31
Child care workers	7.09	—	—	7.86
Amusement and recreation attendants	7.01	7.31	7.52	7.18
Gaming dealers	6.86	—	—	6.78

example, frequently hire young workers, often students, for summer employment. Also, many sports are not played all year, so athletes and people in the service jobs associated with those sports often are seasonally employed.

Employers in some segments of this industry offer benefits not available in other industries. For example, benefits for workers in some theme parks include free passes to the park, transportation to and from work, housing, scholarships, and discounts on park merchandise.

Although unions are not common in most segments of this industry, they are important in professional sports and the performing arts. Many professional athletes, actors, and performers are members of unions. Consequently, earnings of athletes and performers are often determined by union contracts that specify minimum salary rates and working conditions.

Outlook

Wage and salary jobs in arts, entertainment, and recreation are projected to increase about 28 percent over the 2002-12 period, compared with 16 percent for all industries combined. Growing public participation in arts, entertainment, and recreation activities—reflecting increasing incomes, leisure time, and awareness of the health benefits of physical fitness—will provide a large market for establishments providing arts, entertainment, and recreational services.

Changing demographics of the Nation also will have a major impact on industry employment. For example, arts, entertainment, and recreation facilities are expected to increasingly target the growing elderly population. Consequently, employment opportunities may be better in those establishments, such as cruise ships and golf courses, that serve active adults between 50 and 75 years old. Continued growth in hospital and hotel fitness centers and instructional exercise programs, especially those designed and marketed for retirees, also should lead to more job openings. Growth also is expected in those arts, entertainment, and recreation facilities, such as health spas and fitness centers, that cater to younger adults in their twenties and thirties with steadily rising incomes.

In addition to these increases, employment in the performing arts will grow steadily, along with demand for entertainment from a growing population. However, the supply of workers in this segment also will expand because of the appeal of these jobs, ensuring continued intense competition. Additionally, amusement and theme parks should experience rapid growth and offer many seasonal and part-time job opportunities.

The arts, entertainment, and recreation industry has relied heavily on workers under the age of 25 to fill seasonal and unskilled positions. Although the pool of these workers will grow in coming years, opportunities should be good for young, seasonal, part-time, and unskilled workers. In addition, the industry is expected to hire a growing number of workers in other age groups.

Sources of Additional Information

For additional information about careers in the parks and recreation industry and a listing of colleges and universities offering accredited programs in parks and recreation studies, contact:

- National Recreation and Parks Association, 22377 Belmont Ridge Rd., Ashburn, VA 20148.
Internet: <http://www.nrpa.org>

For more information about a career in the field of dance, contact:

- Dance/USA, 1156 15th St. NW., Suite 820, Washington, DC 20005-1726.
Internet: <http://www.danceusa.org>

For more information on employment with carnivals and other outdoor amusement businesses, contact:

- Outdoor Amusement Business Association, 1035 S. Semoran Blvd., Suite 1045A, Winter Park, FL 32792.
Internet: <http://www.oaba.org>

Information on the following occupations found in arts, entertainment, and recreation appears in the 2004-05 *Occupational Outlook Handbook*:

- Actors, producers, and directors
- Archivists, curators, and museum technicians
- Athletes, coaches, umpires, and related workers

- Dancers and choreographers
- Gaming cage workers
- Gaming services occupations
- Grounds maintenance workers
- Musicians, singers, and related workers
- Recreation and fitness workers
- Security guards and gaming surveillance officers

Food Services and Drinking Places

(NAICS 722)

SIGNIFICANT POINTS

- Food services and drinking places provided many young people with their first jobs—in 2002, more than 22 percent of workers in these establishments were aged 16 to 19, almost 5 times the proportion for all industries.
- Cooks, waiters and waitresses, and combined food preparation and serving workers comprised more than half of industry employment.
- About 2 out of 5 employees worked part time, more than twice the proportion for all industries.
- Job opportunities will be plentiful because the large number of young and part-time workers in the industry will generate substantial replacement needs.

Nature of the Industry

Food services and drinking places may be the world's most widespread and familiar industry. These establishments include all types of restaurants, from casual fast-food eateries to formal, elegant dining establishments. The food services and drinking places industry comprises about 479,000 places of employment in large cities, small towns, and rural areas across the United States.

About 45 percent of establishments in this industry are *limited-service eating places*, such as fast-food restaurants, cafeterias, and snack and nonalcoholic beverage bars, that primarily serve patrons who order or select items and pay before eating. *Full-service restaurants* account for about 39 percent of establishments and cater to patrons who order and are served while seated, then pay after eating. *Drinking places (alcoholic beverages)*—bars, pubs, nightclubs, and taverns—primarily prepare and serve alcoholic beverages for consumption on the premises. Drinking places comprise about 11 percent of all establishments in this industry. *Special food services*, such as food service contractors, caterers, and mobile food services, account for 6 percent of establishments in the industry.

The most common type of a limited-service eating place is a franchised operation of a nationwide restaurant chain that sells fast food. Features that characterize these restaurants include a limited menu, the absence of waiters and waitresses, and emphasis on limited service. Menu selections usually offer limited variety and are prepared by workers with minimal cooking skills. Food typically is served in disposable, take-out containers that retain the food's warmth, allowing restaurants to prepare orders in advance of customers' requests. A growing number of fast-food restaurants provide drive-through and walk-up services.

Cafeterias are also included in limited-service eating places and usually offer a somewhat limited selection that varies daily. Cafeterias also may offer separate serving stations for salads or short-order grill items, such as grilled sandwiches or hamburgers, on a regular basis. Patrons select from food and drink items on display in a continuous cafeteria line. Cafeteria selections may include foods that require more complicated preparations and better culinary skills than are required in fast-food restau-

rants. Selections usually are prepared ahead in large quantities and seldom are cooked to the customer's order.

Limited-service snack and nonalcoholic beverage bars carry and sell a combination of snacks, nonalcoholic beverages, and other related products but generally promote and sell a unique snack or beverage for consumption on or near the premises. For example, some prepare and serve specialty snacks including ice cream, frozen yogurt, cookies, or popcorn. Others serve primarily coffee, juices, or soda.

Full-service restaurants offer more menu categories, including appetizers, entrées, salads, side dishes, desserts, and beverages, and varied choices within each category. Chefs and cooks prepare items to order which may run from grilling a simple hamburger to composing a more complex and sophisticated menu item. Waiters and waitresses offer table service in comfortable surroundings.

Cost-conscious and time-strapped patrons increasingly eat at midscale or family-type restaurants rather than at more elegant dining establishments. National chains are a growing segment of full-service restaurants. These restaurants usually offer efficient table service, well-priced familiar menu items prepared by moderately skilled kitchen workers, and a substantially nicer physical setting than limited-service establishments. By contrast, customers at upscale dining places tend to seek a more relaxed and elegant atmosphere with skillfully prepared cuisine and leisurely, but professional service.

Many popular full-service restaurants remain independently owned and locally operated. Independent full-service restaurants generally focus on providing a one-of-a-kind dining experience and distinctive design, décor, and atmosphere. Food and service remain the primary focus of the restaurant's offerings, but physical setting and ambience are important components of that experience. They help establish a restaurant's reputation and build a steady clientele.

Some drinking places also offer patrons limited-dining services in addition to providing alcoholic beverages. In some States, they also sell packaged alcoholic beverages for consumption off the premises. Establishments selling alcoholic beverages are closely regulated by State and local alcoholic beverage control authorities.

Finally, the food services and drinking places industry covers a variety of special food-services establishments, including food-service contractors, concession stands at sporting events, catering firms, and mobile food services, such as ice cream trucks and other street vendors who sell food.

Technology influences the food services and drinking places industry in many ways, enhancing efficiency and productivity. Many restaurants use computers to track orders, inventory, and patron seating. Point-of-service (POS) systems allow servers to key in a customer's order, either tableside using a hand-held device or from a computer terminal in the dining room, and send the order to the kitchen instantaneously so preparation can begin. The same system totals and prints checks, functions as a cash register, connects to credit card authorizers, and tracks sales. Many managers use inventory-tracking software to compare the record of sales from the POS with a record of present inventory to minimize food costs and spoilage. Some establishments enter an inventory of standard ingredients and suppliers into their POS system. When supplies of particular ingredients run low, additional inventory can be ordered directly from the supplier using this preprogrammed information. Computers also allow restaurant and food service managers to more efficiently keep track of employee schedules and pay.

Food service managers use the Internet to track industry news, find recipes, conduct market research, purchase supplies or equipment, recruit employees, and train staff. Internet access also makes service to customers more efficient. Many restaurants maintain websites that include menus and online promotions and provide information about the restaurant's location and offer the option to make a reservation.

Working Conditions

Food services and drinking places employ more part-time workers than other industries. About 2 out of 5 workers in food services and drinking places worked part time in 2002, more than twice the proportion for all industries. Part-time employees, usually waiters and waitresses, dining room attendants, hosts and hostesses, and fast-food employees, typically work shorter days (4-6 hours per day) or fewer days per week than most full-time employees. Full-time employees, often head or executive chefs and food service managers, typically work longer hours (12-hour days are common) and also may be on call to work at other times when needed.

Many establishments in this industry are open long hours, affording some employees an opportunity to tailor work schedules to personal or family needs while allowing others greater flexibility in setting their work hours. Staff typically is needed to work during evening, weekend, and holiday hours. Also, some employees may work split shifts—several hours during one busy period, then off for a few hours, and then return to work during the next busy period—to cover peak demand needs of the restaurant. Some employees may rotate work on some shifts on a regular basis to ensure proper coverage during these times.

Food services and drinking places must comply with local fire, safety, and sanitation regulations. They also must provide appropriate public accommodations and ensure that employees use safe food handling measures. These practices require es-

tablishments to maintain supplies of chemicals, detergents, and other materials that may be harmful if not used properly.

Typical establishments have well-designed kitchens with state-of-the-art cooking and refrigeration equipment and proper electrical, lighting, and ventilation systems to keep everything functioning. However, kitchens usually are noisy, and may be very hot near stoves, grills, ovens, or steam tables. Chefs, cooks, food preparation workers, and other kitchen staff, such as dishwashers, may suffer minor cuts or burns, be subject to scalding or steaming liquids, and spend most of their time standing in a relatively confined area.

Dining areas also may be well-designed, but can become crowded and noisy when busy. Servers, attendants, and other dining-room staff, such as bartenders and hosts or hostesses, need to protect against falls, spills, or burns while serving diners and keeping service areas stocked. Also, dining-room staff must be aware of stairs, raised platforms or other obstacles when directing patrons through narrow areas or to distant seating areas.

Most food services and drinking places workers spend most of their time on their feet—preparing meals, serving diners, or transporting dishes and supplies throughout the establishment. Upper body strength often is needed to lift heavy items, such as trays of dishes, platters of food, or cooking pots. Work during peak dining hours can be very hectic and stressful.

Employees who have direct contact with customers, such as waiters and waitresses or hosts and hostesses, should have a neat appearance and maintain a professional and pleasant manner. Professional hospitality is required from the moment guests enter the restaurant until the time they leave. Sustaining a proper demeanor during busy times or over the course of a long shift may be difficult.

Kitchen staff also needs to be able to work as a team and to communicate with each other. Timing is critical to preparing more complex dishes. Coordinating orders to ensure that an entire table's meals are ready at the same time is essential, particularly in a large restaurant during busy dining periods.

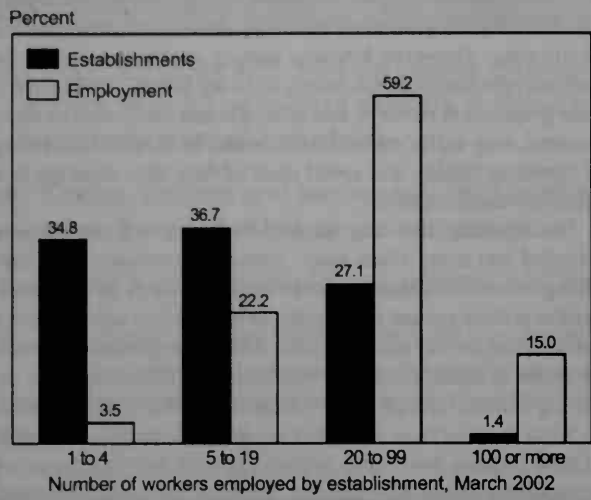
In 2002, the rate of work-related injuries and illnesses was 4.6 per 100 full-time workers in eating and drinking places, slightly less than the average of 5.3 for the private sector. Work hazards include the possibility of burns from hot equipment, sprained muscles, and wrenched backs from heavy lifting and falls on slippery floors.

Employment

The food services and drinking places industry, with about 8.4 million wage and salary jobs in 2002, ranks among the Nation's leading employers. Food services and drinking places tend to be small; more than 70 percent of the establishments in the industry employed fewer than 20 workers (see chart). As a result, this industry often is considered attractive to individuals who want to own and run their own businesses. An estimated 222,000 self-employed people worked in the industry, representing about 3 percent of total employment.

Establishments in this industry, particularly fast-food establishments, are leading employers of teenagers—aged 16 through 19—providing first jobs for many new entrants to the labor force. In 2002, nearly 22 percent of all workers in food services and

Almost three-fourths of the establishments in the food services and drinking places industry employ fewer than 20 workers



drinking places were teenagers, almost 5 times the proportion in all industries (table 1). About 45 percent were under age 25, nearly 3 times the proportion in all industries.

Table 1. Percent distribution of employment in food services and drinking places by age group, 2002

Age group	Food services and drinking places	All industries
Total	100.0	100.0
16-19	22.4	4.6
20-24	22.1	9.8
25-34	22.8	22.2
35-44	16.3	25.8
45-54	10.3	22.9
55-64	4.6	11.5
65 and older	1.6	3.2

Occupations in the Industry

Workers in this industry perform a variety of tasks. They prepare food items from a menu or according to a customer's order, keep food preparation and service areas clean, accept payment from customers, and provide managerial or office services, such as bookkeeping, ordering, and advertising, to the establishment. Cooks, waiters and waitresses, and combined food preparation and serving workers accounted for more than half of food services jobs (table 2).

Employees in the various food services and related occupations deal with customers in a dining area or at a service counter. *Waiters and waitresses* take customers' orders, serve food and beverages, and prepare itemized checks. In fine-dining restaurants, they may describe chef's specials and suggest wines. In some establishments, they escort customers to their seats, accept payments, and set up and clear tables. In many larger restaurants, however, these tasks may be assigned to, or shared with, other workers.

Table 2. Employment of wage and salary workers in food services and drinking places by occupation, 2002 and projected change, 2002-12.
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	8,412	100.0	15.9
Management, business, and financial occupations	316	3.8	15.7
General and operations managers	86	1.0	13.3
Food service managers	189	2.3	16.4
Service occupations	7,393	87.9	16.4
Security guards	32	0.4	5.0
Chefs and head cooks	88	1.0	16.7
First-line supervisors/managers of food preparation and serving workers	471	5.6	16.4
Cooks, fast food	554	6.6	4.3
Cooks, institution and cafeteria	46	0.6	19.5
Cooks, restaurant	616	7.3	16.4
Cooks, short order	163	1.9	6.3
Food preparation workers	376	4.5	23.9
Bartenders	325	3.9	9.6
Combined food preparation and serving workers, including fast food	1,610	19.1	23.7
Counter attendants, cafeteria, food concession, and coffee shop	280	3.3	14.2
Waiters and waitresses	1,757	20.9	17.1
Food servers, nonrestaurant	56	0.7	7.4
Dining room and cafeteria attendants and bartender helpers	262	3.1	15.5
Dishwashers	370	4.4	7.2
Hosts and hostesses, restaurant, lounge, and coffee shop	258	3.1	16.7
Janitors and cleaners, except maids and housekeeping cleaners	50	0.6	11.7
Sales and related occupations	347	4.1	13.8
Cashiers, except gaming	291	3.5	14.1
Retail salespersons	25	0.3	7.1
Office and administrative support occupations	89	1.1	3.1
Bookkeeping, accounting, and auditing clerks	26	0.3	0.4
Office clerks, general	16	0.2	3.7
Transportation and material moving occupations	174	2.1	6.2
Driver/sales workers	123	1.5	3.3
Truck drivers, light or delivery services	34	0.4	16.2

NOTE: May not add to totals due to omission of occupations with small employment.

Other food services occupations include *hosts and hostesses*, who welcome customers, show them to their tables, and offer them menus. *Bartenders* fill drink orders for waiters and waitresses and from customers seated at the bar. *Dining room attendants and bartender helpers* assist waiters, waitresses, and bartenders by clearing, cleaning, and setting up tables, as well as keeping service areas stocked with supplies. *Counter attendants* take orders and serve food at counters, cafeteria steam tables, and fast-food counters. Depending on the size and type of establishment, attendants also may operate cash registers.

Combined food preparation and serving workers, including fast food prepare and serve items in fast-food restaurants. Most take orders from customers at counters or drive-through windows at fast-food restaurants. They assemble orders, hand them to customers, and accept payment. Many of these workers also cook and package food, make coffee, and fill beverage cups using drink-dispensing machines.

Workers in the various food preparation occupations prepare food in the kitchen. *Institution and cafeteria cooks* work in the kitchens of schools, hospitals, industrial cafeterias, and other institutions, where they prepare large quantities of a small variety of menu items. *Restaurant cooks* usually prepare a wider selection of dishes for each meal, cooking individual servings to order. *Short-order cooks* prepare grilled items and sandwiches in establishments that emphasize fast service. *Fast-food cooks* prepare and package a limited selection of food that either is prepared to order or kept warm until sold in fast-food restaurants. *Food preparation workers* clean and prepare basic food ingredients, such as meats, fish, and vegetables for use in making more complex meals, keep work areas clean, and perform simple cooking tasks under the direction of the chef or head cook. *Dishwashers* clean dishes, glasses, pots, and kitchen accessories by hand or by machine.

Food service managers hire, train, supervise, and discharge workers in food services and drinking places establishments. They also purchase supplies, deal with vendors, keep records, and help whenever an extra hand is needed. *Executive chefs* oversee the kitchen, select the menu, train cooks and food preparation workers, and direct the preparation of food. In fine-dining establishments, *maitre d's* may serve as hosts or hostesses while overseeing the dining room. Larger establishments may employ *general managers*, as well as a number of assistant managers. Many managers are part owners of the establishments they manage.

Food services and drinking places may employ a wide range of other workers, including accountants, advertising and public relations workers, bookkeepers, dietitians, mechanics and other maintenance workers, musicians and other entertainers, human resources workers, and various clerks. However, many establishments may choose to contract this work to outside establishments who perform these tasks for several food services and drinking places outlets.

Training and Advancement

The skills and experience required by workers in food services and drinking places differ by occupation and type of establishment. Many entry-level positions, such as waiters and waitresses or food preparation workers, require little or no formal education or previous training. Similarly, work in limited-service eating places generally requires less experience than work in full-service restaurants.

Many fast-food worker or server jobs are held by young or part-time workers. For many youths, this is their first job; for others, part-time schedules allow more flexible working arrangements. On-the-job training, typically under the close supervision of an experienced employee or manager, often lasts a few weeks or less. Some large chain operations require formal training sessions, many using video training programs, for new employees.

Formal training or prior food-service experience for managers, however, is more common. Training may take the form of industry-sponsored seminars; short-term, subject-specific certificate programs; or associate or bachelor's degree programs in culinary arts, hospitality, hotel, or restaurant management. Seminars often address a variety of complex issues faced by food service managers and suggest ways to resolve problems as they occur and to improve the firm's profitability, worker morale, and customer service. Some training topics cover proper food handling and safety issues, or methods for recruiting and motivating quality employees. As more restaurants use computers to keep track of sales and inventory, computer training is becoming increasingly integrated into management training programs.

Larger establishments or regional offices of nationwide chain or franchise operations increasingly use video and satellite TV training programs to educate newly hired staff. This type of corporate training generally covers the restaurant's history, menu, organizational philosophy, and daily operational standards. Nationwide chains often operate their own schools for prospective assistant managers so that they can attend training seminars before acquiring additional responsibilities. Eventually, successful assistant managers may advance to general manager of one of the chain's establishments, to a top management position in another large chain operation, or to a management position in an independent restaurant. Assistant managers in smaller, independent restaurants may learn their duties on the job, while assistant managers in most chain-affiliated establishments receive training through more formal programs.

Completion of postsecondary training is increasingly important for advancement in the food services and drinking places industry. Whether it is in the form of a bachelor's degree or as specialized training in culinary arts or hospitality management, completion of such programs demonstrates both the maturity and motivation required for work in a hectic fast-paced industry. Appropriate training often enables graduates to start as assistant managers. Management programs may last from 18 months, for tailored certificate or associate degree programs, to 4 years, for more comprehensive bachelor's degree programs. Courses are available through junior and community colleges, trade and vocational schools, 4-year colleges and universities, hotel or restaurant associations, and trade unions. The Armed Forces are another source of training and experience in food service work.

Training options for chefs and other kitchen staff are more varied. Some start out in kitchens as food preparation workers and gradually work their way up to cook and chef positions with experience and improved skills. Or they may start in smaller restaurants or in less demanding work stations, such as the cold station, preparing comparatively simple salads or appetizers, then move up to stations where more complicated dishes are made. Working under an experienced chef and gaining progressively more responsible and difficult assignments is one way many cooks advance.

Formal culinary training for chefs and cooks is available through a wide variety of sources—independent cooking schools or academies, junior and community colleges, trade and vocational schools, and 4-year colleges and universities. Many trade associations and unions also certify cooking programs conducted at

selected schools or sponsor Federally approved apprenticeship programs that combine formal classroom instruction with on-the-job experience in a working kitchen. Many cooks gain experience through formal internships, working under the direction of experienced chefs. Some advance to more responsible cooking positions by moving from one kitchen to another.

Most culinary programs now offer more business courses and computer training to better prepare chefs to assume greater leadership and managerial roles in the industry and to manage large, complex food service operations. Culinary training also has adapted to reflect changing food trends and eating habits. For example, chefs and cooks must know a wide variety of food preparation techniques and cooking styles. They also must know how to prepare foods to accommodate various dietary restrictions to satisfy health-conscious eating styles, and to meet the needs of an increasingly international clientele. Chefs and cooks also need to be creative and know how to inspire other kitchen staff to develop new dishes and create inventive recipes.

Promotion opportunities in food services and drinking places vary by occupation and the size of individual establishments. As in other industries, larger establishments and organizations usually offer better advancement opportunities. As beginners gain experience and basic skills, those who choose to pursue careers in food services and drinking places can transfer to other jobs that require greater skill and offer higher earnings. Many workers earn progressively higher incomes as they gain experience or switch to jobs in establishments offering higher pay. For example, waiters and waitresses may transfer to jobs in more expensive or busier restaurants where larger tips are more likely.

Advancement opportunities for food preparation workers are better, particularly for those who work in full-service restaurants. Some people start as unskilled food preparation workers, improve their skills and advance to cook jobs as they pick up kitchen skills. Line cooks also develop and acquire new skills, moving to more demanding stations and eventually to more challenging chef positions. As chefs improve their culinary skills, their opportunities for professional recognition and higher earnings increase. Chefs may advance to executive chef positions and oversee several kitchens within a food service operation, open their own restaurants as chef-proprietors, or move into training positions as teachers or educators.

Many managers of food services and drinking places obtain their positions through hard work and years of restaurant experience. Dining room workers, such as hosts and hostesses or waiters and waitresses, often are promoted to *maitre d'* or into managerial jobs. Many managers of fast-food restaurants advanced from the ranks of hourly workers. Managers with access to the necessary capital may even open their own franchises or independent restaurants.

Earnings

Earnings in food services and drinking places usually are much lower than the average for all industries (table 3). In 2002, average weekly earnings were highest in special food services (\$258) and lowest in drinking places, alcoholic beverages (\$171). Average weekly hours in all food service industries were lower than the average for private industry. Low earnings are

supplemented for many workers by tips from customers. Waiters, waitresses, and bartenders, for example, often derive the majority of their earnings from tips, which depend on menu prices and the volume of customers served. In some establishments, workers who receive tips share a portion of their gratuities with other workers in the dining room and kitchen.

Table 3. Average earnings and hours of nonsupervisory workers in food services and drinking places by industry segment, 2002

Industry segment	Earnings		Weekly hours
	Weekly	Hourly	
Total, private industry	\$506	\$14.95	33.9
Food services and drinking places	189	7.56	25.0
Special food services	258	9.89	26.1
Full-service restaurants	193	7.57	25.5
Limited-service eating places	177	7.20	24.6
Drinking places (alcoholic beverages)	171	7.52	22.7

Earnings vary by occupation, geographic area, and by type and size of establishment. Usually skilled workers, such as chefs, have the highest wages, and workers who are dependent upon tips to supplement earnings have the lowest. Many workers in the industry earn the Federal minimum wage of \$5.15 an hour, or less if tips are included as a substantial part of earnings. A number of employers provide free or discounted meals and uniforms to employees. Earnings in the largest occupations employed in food services and drinking places appear in table 4.

Table 4. Median hourly earnings of the largest occupations in food services and drinking places, 2002

Occupation	Food services and drinking places	All industries
First-line supervisors/managers of food preparation and serving workers	\$11.32	\$11.73
Cooks, restaurant	9.00	9.16
Food preparation workers	7.43	7.85
Counter attendants, cafeteria, food concession, and coffee shop	7.19	7.32
Bartenders	7.12	7.21
Dishwashers	7.06	7.15
Cashiers	6.94	7.41
Cooks, fast food	6.88	6.90
Combined food preparation and serving workers, including fast food	6.87	6.97
Waiters and waitresses	6.76	6.80

Unionization is not widespread in the food services and drinking places industry. In 2002, less than 2 percent of all employees were union members or covered by union contracts, compared with about 15 percent for all industries.

Outlook

Job opportunities in food services and drinking places should be plentiful, because the large number of young and part-time workers in the industry will generate substantial replacement needs. As experienced workers find jobs in other, higher-paying establishments, seek full-time opportunities outside the industry,

or stop working, a large number of job openings will be created for new entrants. Wage and salary jobs in food services and drinking places are expected to increase by 15.9 percent over the 2002-12 period, compared to 16.3-percent growth projected for all industries combined. Numerous job opportunities will be available for people with limited job skills, first-time job seekers, senior citizens, and those seeking part-time or alternative work schedules.

Increases in population, dual-income families, and dining sophistication will contribute to job growth. Consumer demand for convenience and ready-to-heat meal options also will offer cooks and other food preparation workers a wider variety of employment settings in which to work. Moderately priced restaurants that offer table service will afford increasing job opportunities as these businesses expand to accommodate the growing demand of an older and more mobile population and cater to families with young children. Fine-dining establishments, which appeal more to affluent, often older, customers, also should grow as the 45-and-older population increases rapidly. The numbers of limited-service and fast-food restaurants that appeal to younger diners should increase more slowly than in the past. As schools, hospitals, and company cafeterias contract out institutional food services, jobs should shift to firms specializing in these services. Some of the increased demand for food services will be met through more supermarket food service options, self-service facilities such as salad bars, untended meal stations, and automated beverage stations.

Occupational projections reflect different rates of growth among the various segments of the food services and drinking places industry (table 2). Employment in occupations concentrated in full-service restaurants—including skilled chefs and head cooks, waiters and waitresses, and hosts and hostesses—is expected to grow slightly faster than overall employment in the food services and drinking places industry. On the other hand, employment in many occupations concentrated in limited-service and fast-food restaurants—including fast-food and short-order cooks—is expected to increase more slowly than overall employment in the food services and drinking places industry. Duties of cooks in fast-food restaurants are limited; faster growth is expected for combined food preparation and serving workers who both prepare and serve items in fast-food restaurants.

Those who qualify—either through experience or formal culinary training—for skilled head cook and chef positions should be in demand. The greatest number of job openings will be in the

largest occupations—waiters and waitresses and combined food preparation and serving workers—which also have high replacement needs.

Employment of salaried managers is projected to increase about as fast as the overall average for the industry as a result of sustained growth in chain and franchised establishments. Graduates of college hospitality programs, particularly those with good computer skills, should have especially good opportunities. The growing dominance of chain-affiliated food services and drinking places also should enhance opportunities for advancement from food service manager positions into general manager and corporate administrative jobs. Employment of self-employed managers in independent food services and drinking places is expected to remain steady.

Sources of Additional Information

For additional information about careers and training in the food services and drinking places industry, contact:

- National Restaurant Association, 1200 17th St. NW., Washington, DC 20036.
Internet: <http://www.restaurant.org>
- The American Culinary Federation, 180 Center Place Way, St. Augustine, FL 32095.
Internet: <http://www.acfchefs.org>

For a list of educational programs in the food services and drinking industry, contact:

- The International Council on Hotel, Restaurant, and Institutional Education, 2613 North Parham Rd., 2nd Floor, Richmond, VA 23294. Internet: <http://www.chrie.org>

Information on vocational education courses for food preparation and service careers may be obtained from your State or local director of vocational education or superintendent of schools.

Information on these and other occupations found in food services and drinking places appears in the 2004-05 edition of the *Occupational Outlook Handbook*:

- Cashiers
- Chefs, cooks, and food preparation workers
- Food and beverage serving and related workers
- Food service managers

Hotels and Other Accommodations

(NAICS 721)

SIGNIFICANT POINTS

- Service occupations, by far the largest occupational group, account for 66 percent of the industry's employment.
- Hotels employ many young workers and others in part-time and seasonal jobs.
- Average earnings are lower than in most other industries.

Nature of the Industry

Hotels and other accommodations are as diverse as the many families and business travelers they accommodate. The industry includes all types of lodging, from upscale hotels to RV parks. Motels, resorts, casino hotels, bed-and-breakfast inns, and boarding houses also are included. In fact, nearly 61,000 establishments provided overnight accommodations to suit many different needs and budgets in 2002.

Establishments vary greatly in size and in the services they provide. *Hotels and motels* make up the majority of establishments and tend to provide more services than do other lodging places. There are five basic types of hotels—*commercial, resort, residential, extended-stay, and casino*. Most hotels and motels are commercial properties that cater mainly to business people, tourists, and other travelers who need accommodations for a brief stay. Commercial hotels and motels usually are located in cities or suburban areas and operate year round. Larger properties offer a variety of services for their guests, including coffee shops, restaurants, and cocktail lounges with live entertainment. Some even provide gift shops, newsstands, barber and beauty shops, laundry and valet services, theater and airline counters, swimming pools, and fitness centers and health spas.

Larger hotels and motels often have banquet rooms, exhibit halls, and spacious ballrooms to accommodate conventions, business meetings, wedding receptions, and other social gatherings. Conventions and business meetings are major sources of revenue for these hotels and motels. Some *commercial hotels* are known as conference hotels—fully self-contained entities specifically designed for meetings. They provide physical and recreational facilities for meetings, in addition to state-of-the-art audiovisual and technical equipment.

Resort hotels and motels offer luxurious surroundings with a variety of recreational facilities such as swimming pools, golf courses, tennis courts, gamerooms, and health spas, as well as planned social activities and entertainment. Resorts are located primarily in vacation destinations near mountains, the seashore, or other attractions. As a result, the business of many resorts fluctuates with the season. Some resort hotels and motels provide additional convention and conference facilities to encourage customers to combine business with pleasure. During their off season, these establishments solicit conventions, sales meetings, and incentive tours to fill their otherwise empty rooms.

Residential hotels provide living quarters for permanent and semipermanent residents. They combine the comfort of apartment living with the convenience of hotel services. Many have

dining rooms and restaurants that also are open to the general public.

Extended-stay hotels combine features of a resort and a residential hotel. Typically, guests use these hotels for a minimum of 5 consecutive nights. These facilities usually provide rooms with fully equipped kitchens, entertainment systems, ironing boards and irons, office spaces with computer and telephone lines, access to fitness centers, and other amenities.

Casino hotels provide lodging in hotel facilities with a casino on the premises. The casino provides table wagering games and may include other gambling activities, such as slot machines and sports betting. Casino hotels generally offer a full range of services and amenities and may also contain conference and convention facilities.

In addition to hotels and motels, *bed-and-breakfast inns, recreational vehicle (RV) parks, campgrounds, and rooming and boarding houses* provide lodging for overnight guests. Bed-and-breakfast inns provide short-term lodging in private homes or small buildings converted for this purpose and are characterized by highly personalized service and inclusion of a full breakfast in the room rate. Their appeal is quaintness, with unusual service and decor.

RV parks and recreational camps cater to people who enjoy recreational camping at moderate prices. Some parks and campgrounds provide service stations, general stores, shower and toilet facilities, and coin-operated laundries. While some are designed for overnight travelers only, others are for vacationers who stay longer. Some camps provide accommodations, such as cabins and fixed campsites, and other amenities, such as food services, recreational facilities and equipment, and organized recreational activities. Examples of these overnight camps include, children's camps, family vacation camps, hunting and fishing camps, and outdoor adventure retreats that offer trail riding, white-water rafting, hiking, and similar activities.

Other short-term lodging facilities in this industry include guesthouses, or small cottages located on the same property as a main residence, and youth hostels—dormitory-style hotels with few frills, occupied mainly by students traveling on low budgets. Also included are rooming and boarding houses, such as fraternity houses, sorority houses, off-campus dormitories, and workers' camps. These establishments provide temporary or longer term accommodations that may serve as a principal residence for the period of occupancy. These establishments also may provide services such as housekeeping, meals, and laundry services.

In recent years, hotels, motels, camps, and recreational and RV parks affiliated with national chains have been growing rapidly. To the traveler, familiar chain establishments represent dependability and quality at predictable rates. National corporations own many chains, although several others are independently owned but affiliated with a chain through a franchise agreement.

Increases in competition and in the sophistication of travelers have induced the chains to provide lodging to serve a variety of customer budgets and accommodation preferences. In general, these lodging places may be grouped into properties that offer luxury, all-suite, moderately priced, and economy accommodations. The numbers of limited-service or economy chain properties—economy lodging without lobbies, restaurants, lounges, and meeting rooms—have been growing. These properties are not as costly to build and operate. They appeal to budget-conscious family vacationers and travelers who are willing to sacrifice amenities for lower room prices.

While economy chains have become more prevalent, the movement in the hotel and lodging industry is towards more extended-stay properties. In addition to fully equipped kitchenettes and laundry services, the extended-stay market offers guest amenities such as in-room access to the Internet and grocery shopping. This segment of the hotels and other accommodations industry has eliminated traditional hotel lobbies and 24-hour personnel, and housekeeping is usually done only about once a week. This helps to keep costs to a minimum.

All-suite facilities, especially popular with business travelers, offer a living room and a bedroom. These accommodations are aimed at travelers who require lodging for extended stays, families traveling with children, and business people needing to conduct small meetings without the expense of renting an additional room.

Increased competition among establishments in this industry has spurred many independently owned and operated hotels and other lodging places to join national or international reservation systems, which allow travelers to make multiple reservations for lodging, airlines, and car rentals with one telephone call. Nearly all hotel chains operate online reservation systems through the Internet.

Working Conditions

Work in hotels and other accommodations can be hectic, particularly for those providing check-in and checkout services. Hotel desk clerks must quickly, accurately, and cordially process large numbers of sometimes impatient and irate guests. Hotel managers often experience pressure and stress when coordinating a wide range of events such as conventions, business meetings, and social gatherings. Further, large groups of tourists can present unusual problems requiring extra work and long hours.

Because hotels are open around the clock, employees frequently work varying shifts. Employees who work the late shift generally receive additional compensation. Although managers who live in the hotel usually have regular work schedules, they may be called at any time in the event of an emergency. Those who are self-employed tend to work long hours and often live at the establishment.

Food preparation and food service workers in hotels must withstand the strain of working during busy periods and being on their feet for many hours. Kitchen workers lift heavy pots and kettles and work near hot ovens and grills. Job hazards include slips and falls, cuts, and burns, but injuries are seldom serious. Food service workers often carry heavy trays of food, dishes, and glassware. Many of these workers work part time, including evenings, weekends, and holidays.

In 2002, work-related injuries and illnesses averaged 6.6 for every 100 full-time workers in hotels and other accommodations, compared with 5.3 for workers throughout private industry. Work hazards include burns from hot equipment, sprained muscles and wrenched backs from heavy lifting, and falls on wet floors.

Employment

Hotels and other accommodations provided 1.8 million wage and salary jobs in 2002. In addition, there were about 37,000 self-employed workers in the industry, who were found in bed-and-breakfast inns, camps, and small motels.

Employment is concentrated in densely populated cities and resort areas. Compared with establishments in other industries, hotels, motels, and other lodging places tend to be small. More than 75 percent employed fewer than 20 people; about 42 percent employ fewer than 5 workers (chart). As a result, lodging establishments offer opportunities for those who are interested in owning and running their own business. Although establishments tend to be small, the majority of jobs are in large hotels and motels with more than 100 employees.

Many of the industry's workers are young because hotels and other lodging places provide first jobs to many new entrants to the labor force. In 2002, about 21 percent of the workers were younger than age 25, compared with about 14 percent across all industries (table 1).

The majority of jobs in hotels and other accommodations are in establishments with 100 or more employees

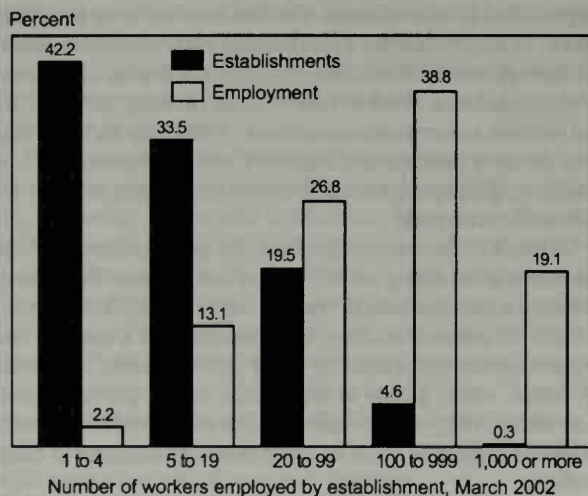


Table 1. Percent distribution of employment in hotels and other accommodations by age group, 2002

Age group	Hotels and other accommodations	All industries
Total	100.0	100.0
16-19	6.8	4.6
20-24	14.4	9.8
25-34	23.2	22.2
35-44	23.0	25.8
45-54	19.1	22.9
55-64	10.0	11.5
65 and older	3.5	3.2

Occupations in the Industry

The vast majority of workers in this industry—more than 8 out of 10 in 2002—were employed in service and office and administrative support occupations (table 2). Workers in these occupations usually learn their skills on the job. Postsecondary education is not required for most entry-level positions; however, college training may be helpful for advancement in some of these occupations. For many administrative support and service occupations, personality traits and special abilities may be more important than formal schooling. Traits most important for success in the hotel and motel industry are good communication skills; the ability to get along with people in stressful situations; a neat, clean appearance; and a pleasant manner.

Service occupations, by far the largest occupational group, account for 66 percent of the industry's employment. Most service jobs are in housekeeping and building service occupations—including maids, housekeepers, janitors, linen-room attendants, and laundry workers—and in food preparation and service jobs—including chefs and cooks, waiters and waitresses, bartenders, food counter workers, and various kitchen workers.

Workers in *cleaning and housekeeping occupations* ensure that the lodging facility is clean and in good condition for the comfort and safety of guests. *Maids and housekeepers* clean lobbies, halls, guestrooms, and bathrooms. They make sure that guests not only have clean rooms, but all the necessary furnishings and supplies. They change sheets and towels, vacuum carpets, dust furniture, empty wastebaskets, and mop bathroom floors. In large hotels, the housekeeping staff may include assistant housekeepers, floor supervisors, housekeepers, and executive housekeepers. *Janitors* help with the cleaning of the facility and perform minor maintenance work. They may fix leaky faucets, do some painting and carpentry, see that heating and air-conditioning equipment works properly, empty trash, mow lawns, and exterminate pests.

Workers in the various *food service* occupations deal with customers in the dining room or at a service counter. *Waiters and waitresses* take customers' orders, serve meals, and prepare checks. In restaurants, they may describe chef's specials and suggest appropriate wines. In small establishments, they often set tables, escort guests to their seats, accept payments, and clear tables. They also may deliver room service orders to guests. In large restaurants, some of these tasks are assigned to other workers.

Hosts and hostesses welcome guests, show them to their tables, and give them menus. *Bartenders* fill beverage orders

Table 2. Employment of wage and salary workers in hotels and other accommodations by occupation, 2002 and projected change, 2002-12.

(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,780	100.0	16.9
Management, business, and financial occupations	108	6.1	19.1
Top executives	19	1.1	20.7
Food service managers	12	0.7	11.6
Lodging managers	27	1.5	9.0
Service occupations	1,170	65.7	15.8
Security guards	30	1.7	11.5
Chefs and head cooks	14	0.8	11.6
First-line supervisors managers of food preparation and serving workers ..	20	1.2	11.6
Cooks, restaurant	55	3.1	11.6
Food preparation workers	21	1.2	23.8
Bartenders	39	2.2	5.5
Fast food and counter workers	23	1.3	19.6
Waiters and waitresses	142	8.0	11.5
Food servers, nonrestaurant	41	2.3	8.7
Dining room and cafeteria attendants and bartender helpers	46	2.6	11.4
Dishwashers	41	2.3	5.6
Hosts and hostesses, restaurant, lounge, and coffee shop	22	1.2	11.5
First-line supervisors managers of housekeeping and janitorial workers	33	1.9	18.6
Janitors and cleaners, except maids and housekeeping cleaners	51	2.9	15.5
Maid and housekeeping cleaners	396	22.3	18.9
Landscaping and groundskeeping workers	21	1.2	19.0
First-line supervisors managers, gaming workers	17	1.0	29.3
Gaming dealers	35	2.0	29.3
Baggage porters and bellhops	24	1.4	12.4
Sales and related occupations	54	3.1	18.9
Cashiers, except gaming	18	1.0	15.2
Gaming change persons and booth cashiers	11	0.6	23.9
Office and administrative support occupations	298	16.7	17.9
First-line supervisors managers of office and administrative support workers	19	1.1	7.1
Bookkeeping, accounting, and auditing clerks	23	1.3	7.1
Hotel, motel, and resort desk clerks	168	9.4	23.9
Reservation and transportation ticket agents and travel clerks	13	0.7	38.0
Secretaries and administrative assistants	17	1.0	2.2
Office clerks, general	10	0.5	7.8
Installation, maintenance, and repair occupations	70	3.9	24.0
Maintenance and repair workers, general ..	58	3.3	23.9
Production occupations	38	2.1	23.2
Laundry and dry-cleaning workers	30	1.7	23.9
Transportation and material moving occupations	27	1.5	9.5
Laborers and freight, stock, and material movers, hand	9	0.5	1.8

NOTE: May not add to totals due to omission of occupations with small employment.

that waiters and waitresses take from the customers at tables and seated at the bar. *Dining room and cafeteria attendants* and *bartender helpers* assist waiters, waitresses, and bartenders by clearing, cleaning, and setting up tables, and by keeping the serving areas stocked with linens, tableware, and other supplies. *Counter attendants* take orders and serve food at fast-food counters and in coffee shops. They also may operate the cash register.

Workers in the various *food preparation* occupations prepare food in the kitchen. Beginners may advance to more skilled food preparation jobs with experience or specialized culinary training. *Food preparation workers* shred lettuce for salads, cut up food for cooking, and perform simple cooking under the direction of the chef or head cook. *Chefs* and *cooks* generally prepare a wide selection of dishes, often cooking individual servings to order. Large hotels employ cooks who specialize in the preparation of many different kinds of food. They may have titles such as salad chef, roast chef, sauce chef, or dessert chef. Chef positions generally are attained after years of experience and, sometimes, formal training, including apprenticeships. Large establishments also have *chief stewards* and *assistant stewards* who plan menus, purchase food, and supervise various kitchen personnel.

Many full-service hotels employ a uniformed staff to assist arriving and departing guests. *Baggage porters* and *bellhops* carry bags and escort guests to their rooms. *Concierges* arrange special or personal services for guests. They may take messages, arrange for babysitting, make hotel reservations in other cities, arrange for or give advice on entertainment, and monitor requests for housekeeping and maintenance. *Doorkeepers* help guests into and out of their cars or taxis, summon taxis, and carry baggage into the hotel lobby.

Hotels also employ the largest percentage of *gaming services* workers because much of gaming takes place in casino hotels. Some gaming services positions are associated with oversight and direction—supervision, surveillance, and investigation—while others involve working with the games or patrons themselves, by tending the slot machines, handling money, writing and running tickets, dealing cards, and performing related duties.

Office and administrative support positions accounted for 17 percent of the jobs in hotels and other accommodations in 2002. Hotel desk clerks, secretaries, bookkeeping and accounting clerks, and telephone operators ensure that the front office operates smoothly. The majority of these workers are *hotel, motel, and resort desk clerks*. They process reservations and guests' registration and checkout, monitor arrivals and departures, handle complaints, and receive and forward mail. The duties of hotel desk clerks depend on the size of the facility. In small lodging places, one clerk or a manager may do everything. In large hotels, the duties are divided among several types of clerks. Although hotel desk clerks sometimes are hired from the outside, openings usually are filled by promoting other hotel employees such as bellhops and porters, credit clerks, and other administrative support workers.

Hotels and other lodging places employ many different types of *managers* to direct and coordinate the activities of the front office, kitchen, dining room, and other departments, such as

housekeeping, accounting, personnel, purchasing, publicity, sales, and maintenance. Managers make decisions on room rates, establish credit policy, and have ultimate responsibility for resolving problems. In small establishments, the manager also may perform much of the front-office clerical work. In the smallest establishments, the owners—sometimes a family team—do all the work necessary to operate the business.

Lodging managers or *general and operations managers* in large hotels often have several assistant managers, each responsible for a phase of operations. For example, *food service managers* oversee restaurants, lounges, and catering operations. Large hotels and conference centers also employ *public relations* and *sales managers* to promote their image and to attract business. Large hotels have many different sales managers, including convention managers, merchandise managers, foreign sales managers, and tour and agency managers. Sales managers often travel around the country selling their meeting, banquet, and convention facilities.

Workers at vacation and recreational camps may include camp counselors who lead and instruct children and teenagers in outdoor-oriented forms of recreation, such as swimming, hiking, horseback riding, and camping. In addition, counselors at vacation and resident camps also provide guidance and supervise daily living and general socialization. Other types of campgrounds may employ trail guides for activities such as hiking, hunting, and fishing.

Hotels and other lodging places employ a variety of workers found in many other industries. Among these are cashiers, accountants, personnel workers, entertainers, recreation workers, and maintenance workers, such as stationary engineers, plumbers, and painters. Still others include guards and security officers, barbers, cosmetologists, valets, gardeners, and parking attendants.

Training and Advancement

Although the skills and experience needed by workers in this industry depend on the specific occupation, most entry-level jobs require little or no previous training. Basic tasks usually can be learned in a short time. Almost all workers in the hotel and other accommodations industry undergo on-the-job training, which usually is provided under the supervision of an experienced employee or manager. Some large chain operations have formal training sessions for new employees, and others have video training programs.

Hotel operations are becoming increasingly complex, however, with a greater emphasis being placed on specialized training. Therefore, the demand is increasing for people with special skills obtained in colleges, junior colleges, technical institutes, vocational schools, and high schools. Vocational courses and apprenticeship programs in food preparation, catering, and hotel and restaurant management, offered through restaurant associations and trade unions, provide training opportunities. Programs range in length from a few months to several years. About 200 community and junior colleges offer 2-year degree programs in hotel and restaurant management. The U.S. Armed Forces also offer experience and training in food service.

Traditionally, many hotels filled first-level manager positions by promoting administrative support and service workers—par-

ticularly those with good communication skills, a solid educational background, tact, loyalty, and a capacity to endure hard work and long hours. People with these qualities still advance to manager jobs but, more recently, lodging chains have primarily been hiring persons with 4-year college degrees in the liberal arts or other fields and starting them in trainee or junior management positions. Bachelor's and master's degree programs in hotel and restaurant management provide the strongest background for a career as a hotel manager, with nearly 150 colleges and universities offering such programs. Graduates of these programs are enthusiastically sought by employers in this industry. New graduates often go through on-the-job training programs before being given much responsibility. Eventually, they may advance to a top management position in a large chain operation.

Upper management positions, such as general manager, lodging manager, food service manager, or sales manager, generally require considerable formal training and job experience. Some department managers, such as comptrollers, purchasing managers, executive housekeepers, and executive chefs, generally require some specialized training and extensive on-the-job experience. To advance to positions with more responsibilities, managers frequently change employers or relocate to a chain property in another area.

For office and administrative support and service workers, advancement opportunities in the hotel industry vary widely. Some workers, such as housekeepers and janitors, generally have few opportunities for advancement. In large properties, however, some janitors may advance to supervisory positions. Hotel desk clerks, hospitality workers, and chefs sometimes advance to managerial positions. Promotional opportunities from the front office often are greater than those from any other department, because one has an excellent opportunity to learn the establishment's overall operation from this vantage point. Front-office jobs are excellent entry-level jobs and can serve as a steppingstone to jobs in hospitality, public relations, advertising, sales, and management.

Advancement opportunities for chefs and cooks are better than those for most other service occupations. Cooks often advance to chef or to supervisory and management positions, such as executive chef, restaurant manager, or food service manager. Some transfer to jobs in clubs, go into business for themselves, or become instructors of culinary arts.

Earnings

Earnings in hotels and other accommodations generally are much lower than the average for all industries. In 2002, average earnings for all nonsupervisory workers in this industry were \$10.01 an hour, or \$297 a week, compared with \$14.95 an hour, or \$506 a week, for workers throughout private industry. Many workers in this industry earn the Federal minimum wage of \$5.15 an hour. Some States have laws that establish a higher minimum wage. Federal laws, however, allow employers to pay below the minimum wage when an employee is expected to receive tips.

Food and beverage service workers, as well as hosts and hostesses, maids and housekeeping cleaners, concierges, and baggage porters and bellhops, derive their earnings from a combination of hourly earnings and customer tips. Waiters and waitresses often derive the majority of their earnings from tips, which

vary greatly depending on menu prices and the volume of customers served. Many employers also provide free meals and furnish uniforms. Food service personnel may receive extra pay for working at banquets and on other special occasions. In general, workers with the greatest skills, such as restaurant cooks, have the highest earnings, and workers who receive tips have the lowest. Earnings in the largest occupations in hotels and other lodging places appear in table 3.

Salaries of lodging managers are dependent upon the size and sales volume of the establishment and their specific duties and responsibilities. Managers may earn bonuses ranging up to 20 percent of their basic salary. In addition, they and their families may be furnished with lodging, meals, parking, laundry, and other services. Some hotels offer profit-sharing plans, tuition reimbursement, and other benefits to their employees.

About 8 percent of the workers in hotels and other accommodations are union members or are covered by union contracts, compared with 15 percent of workers in all industries combined.

Table 3. Median hourly earnings of the largest occupations in hotels and other accommodations, 2002

Occupation	Accommodations	All industries
Maintenance and repair workers, general	\$10.48	\$14.12
Cooks, restaurant	10.47	9.16
Janitors and cleaners, except maids and housekeeping cleaners	8.61	8.77
Hotel, motel, and resort desk clerks	8.32	8.35
Bartenders	7.93	7.21
Dishwashers	7.85	7.15
Maids and housekeeping cleaners	7.57	7.90
Dining room and cafeteria attendants and bartender helpers	7.45	6.99
Food servers, nonrestaurant	7.33	7.52
Waiters and waitresses	6.96	6.80

Outlook

Wage and salary employment in hotels and other accommodations is expected to increase by 17 percent over the 2002-12 period, compared with 16 percent growth projected for all industries combined. Recently, business and leisure travelers have cut back on travel due to the weak economy and security concerns. However, over the long-run, travel should pick up as the economy improves and people feel more comfortable about traveling again. In addition, as more States legalize some form of gambling, the hotel industry will increasingly invest in gaming, further fueling job growth.

Job opportunities should be concentrated in the largest hotel occupations, such as building cleaning workers and hotel, motel, and resort desk clerks. Many of these openings will arise in full-service hotels and resorts and spas, simply because they employ the most workers. Because all-suite properties and extended-stay and budget hotels and motels do not have restaurants, dining rooms, lounges, or kitchens, these limited-service establishments offer a narrower range of employment opportunities.

Employment outlook varies by occupation. Employment of hotel, motel, and resort desk clerks is expected to grow faster

than some other occupations in the industry as some of these workers assume responsibilities previously reserved for managers. However, the spread of computer technology will cause employment of other clerical workers—bookkeeping, accounting, and auditing clerks and secretaries, for example—to grow more slowly than employment in the industry as a whole. Employment of waiters and waitresses also will grow more slowly—reflecting the growing number of hotels and other accommodations that do not offer full-service restaurants. Similarly, employment of lodging managers will not grow as fast due to the growth of economy-class establishments with fewer departments to manage. However, the trend toward chain-affiliated hotels and motels should provide managers with opportunities for advancement into general manager positions and corporate administrative jobs. Opportunities should be more limited for self-employed managers or owners of small lodging places. Job opportunities at outdoor recreation and RV parks should grow as RVs and driving vacations gain popularity in the United States. Also, gaming services and gaming manager occupations should grow as more casino hotels are built.

Job turnover is relatively high in certain occupations employed in this industry. To attract and retain workers, the hotel and other accommodations industry is placing more emphasis on hiring and training. Nevertheless, many young people and others who are looking only for seasonal or part-time work, and not a career, take food service and clerical jobs that require little or no previous training. Therefore, job opportunities in this industry are plentiful for first-time jobseekers and people with limited skills.

Sources of Additional Information

For information on hospitality careers, write to:

- International Council on Hotel, Restaurant, and Institutional Education, 2613 North Parham Rd., 2nd floor, Richmond, VA 23294. Internet: <http://www.chrie.org>

- American Hotel and Lodging Association, 1201 New York Ave. NW, #600, Washington, DC 20005-3931.

General information on food and beverage service jobs is available from:

- National Restaurant Association, 1200 17th St. NW., Washington, DC 20036-3097.
Internet: <http://www.restaurant.org>

Information on housekeeper and housekeeping management may be obtained from:

- International Executive Housekeepers Association, 1001 Eastwind Dr., Suite 301, Westerville, OH 43081. Phone: (800) 200-6342. Internet: <http://www.ieha.org>

For information on the American Culinary Federation's apprenticeship and certification programs for cooks, write to:

- American Culinary Federation, 10 San Bartola Dr., St. Augustine, FL 32086. Internet: <http://www.acfchefs.org>

Detailed information on the following occupations employed in hotels and other accommodations may be found in the 2004-05 *Occupational Outlook Handbook*:

- Building cleaning workers
- Chefs, cooks, and other food preparation workers
- Food and beverage serving and related workers
- Food service managers
- Hotel, motel, and resort desk clerks
- Gaming cage workers
- Gaming services occupations
- Lodging managers
- Recreation and fitness workers
- Security guards and gaming surveillance officers

Government



Federal Government, Excluding the Postal Service

SIGNIFICANT POINTS

- About 3 out of 5 Federal workers held managerial, business, financial, or professional jobs in 2002, double the proportion for the workforce as a whole.
- About 4 out of 5 Federal employees worked outside the Washington, DC, metropolitan area.
- Employment in the newly created Department of Homeland Security (DHS) will include new hires, as well as workers transferring from other agencies—mostly from within the Departments of Justice, Transportation, Agriculture, and the Treasury.
- Job growth generated by increased homeland security needs may be largely offset by projected slow growth or declines in other Federal sectors due to budgetary constraints, the growing use of private contractors, and the transfer of some functions to State and local governments.

Nature of the Industry

The Federal Government's essential duties include defending the United States from foreign aggression and terrorism, representing U.S. interests abroad, enforcing laws and regulations, and administering domestic programs and agencies. U.S. citizens are particularly aware of the Federal Government when they pay their income taxes each year, but they usually do not consider the government's role when they watch a weather forecast, purchase fresh and uncontaminated groceries, travel by highway or air, or make a deposit at their bank. Workers employed by the Federal Government play a vital role in these and many other aspects of our daily lives. (While career opportunities in the U.S. Postal Service and the Armed Forces are not covered here, both are described in the 2004-05 edition of the *Occupational Outlook Handbook*. See the *Handbook* statements on Postal Service workers and job opportunities in the Armed Forces.)

Over 200 years ago, the founders of the United States gathered in Philadelphia, PA, to create a constitution for a new national government and lay the foundation for self-governance. The Constitution of the United States, ratified by the last of the 13 original States in 1791, created the three branches of the Federal Government and granted certain powers and responsibilities to each. The legislative, judicial, and executive branches were created with equal powers but very different responsibilities that act to keep their powers in balance.

The legislative branch is responsible for forming and amending the legal structure of the Nation. Its largest component is Congress, the primary U.S. legislative body, which is made up of the Senate and the House of Representatives. This body includes senators, representatives, their staffs, and various support workers. The legislative branch employs only about 1 percent of Federal workers, nearly all of whom work in the Washington, DC, area.

The judicial branch is responsible for interpreting the laws that the legislative branch enacts. The Supreme Court, the Nation's definitive judicial body, makes the highest rulings. Its decisions usually follow the appeal of a decision made by the one of the regional Courts of Appeal, which hear cases appealed from U.S. District Courts, the Court of Appeals for the Federal

Circuit, or State Supreme Courts. U.S. District Courts are located in each State and are the first to hear most cases under Federal jurisdiction. The judicial branch employs about the same number of people as does the legislative branch, but its offices and employees are dispersed throughout the country.

Of the three branches, the executive branch—through the power vested by the Constitution in the office of the President—has the widest range of responsibilities. Consequently, it employed about 98 percent of all Federal civilian employees (excluding Postal Service workers) in 2002. The executive branch is composed of the Executive Office of the President, 15 executive Cabinet departments—including the newly created Department of Homeland Security, and nearly 90 independent agencies, each of which has clearly defined duties. The Executive Office of the President is composed of several offices and councils that aid the President in policy decisions. These include the Office of Management and Budget, which oversees the administration of the Federal budget; the National Security Council, which advises the President on matters of national defense; and the Council of Economic Advisers, which makes economic policy recommendations.

Each of the 15 executive Cabinet departments administers programs that oversee an aspect of life in the United States. The highest departmental official of each Cabinet department, the Secretary, is a member of the President's Cabinet. Each, listed by employment size, is described below (table 1).

- **Defense:** Manages the military forces that protect our country and its interests, including the Departments of the Army, Navy, and Air Force and a number of smaller agencies. The civilian workforce employed by the Department of Defense performs various support activities, such as payroll and public relations.
- **Veterans Affairs:** Administers programs to aid U.S. veterans and their families, runs the veterans' hospital system, and operates our national cemeteries.
- **Homeland Security:** Works to prevent terrorist attacks within the United States, reduce vulnerability to terrorism, and minimize the damage from potential attacks and natural disasters. Conceived after the September 11, 2001, attacks

and officially established in early 2003, the DHS will include new hires, as well as workers transferring from other agencies—mostly from within the Departments of Justice, Transportation, Agriculture, and the Treasury. Agencies will be housed in 1 of 4 major directorates: Border and Transportation Security, Emergency Preparedness and Response, Science and Technology, and Information Analysis and Infrastructure Protection.

- **Treasury:** Regulates banks and other financial institutions, administers the public debt, prints currency, and collects Federal income taxes.
- **Justice:** Enforces Federal laws, prosecutes cases in Federal courts, and runs Federal prisons.
- **Agriculture:** Promotes U.S. agriculture domestically and internationally and sets standards governing quality, quantity, and labeling of food sold in the United States.
- **Interior:** Manages Federal lands, including the national parks and forests; runs hydroelectric power systems; and promotes conservation of natural resources.
- **Health and Human Services:** Sponsors medical research, approves use of new drugs and medical devices, runs the Public Health Service, and administers Medicare.
- **Transportation:** Sets national transportation policy; plans and funds the construction of highways and mass transit systems; and regulates railroad, aviation, and maritime operations.
- **Commerce:** Forecasts the weather, charts the oceans, regulates patents and trademarks, conducts the census, compiles statistics, and promotes U.S. economic growth by encouraging international trade.
- **State:** Oversees the Nation's embassies and consulates, issues passports, monitors U.S. interests abroad, and represents the United States before international organizations.
- **Labor:** Enforces laws guaranteeing fair pay, workplace safety, and equal job opportunity; administers unemployment insurance; regulates pension funds; and collects and analyzes economic data through its Bureau of Labor Statistics.
- **Energy:** Coordinates the national use and provision of energy, oversees the production and disposal of nuclear weapons, and plans for future energy needs.
- **Housing and Urban Development:** Funds public housing projects, enforces equal housing laws, and insures and finances mortgages.
- **Education:** Provides scholarships, student loans, and aid to schools.

Numerous independent agencies perform tasks that fall between the jurisdictions of the executive departments or that are more efficiently executed by an autonomous agency. Some smaller, but well-known, independent agencies include the Peace Corps, the Securities and Exchange Commission, and the Federal Communications Commission. Although the majority of these agencies are fairly small, employing fewer than 1,000 workers (many employ fewer than 100 workers), some are quite large. The largest independent agencies are:

- **Social Security Administration:** Operates various retirement and disability programs and Medicaid.

Table 1. Federal Government executive branch civilian employment, except U.S. Postal Service, March 2003
(Employment in thousands)

	United States	Washington, DC area
Total	1,871	281
Executive departments	1,687	231
Defense, total	664	62
Army	230	19
Navy	184	25
Air Force	151	5
Other	99	13
Veterans Affairs	225	7
Homeland Security	152	16
Treasury	132	16
Justice	101	22
Agriculture	99	12
Interior	71	8
Health and Human Services	67	30
Transportation	59	10
Commerce	37	20
State	32	11
Labor	16	5
Energy	16	5
Housing and Urban Development	11	3
Education	5	3
Independent agencies	183	49
Social Security Administration	64	2
National Aeronautics and Space Administration	19	4
Environmental Protection Agency	18	6
Tennessee Valley Authority	13	0
General Services Administration	13	5
Federal Deposit Insurance Corporation	5	2
Other	50	32

SOURCE: U.S. Office of Personnel Management

- **National Aeronautics and Space Administration:** Oversees aviation research and conducts exploration and research beyond the Earth's atmosphere.
- **Environmental Protection Agency:** Runs programs to control and reduce pollution of the Nation's water, air, and lands.
- **Tennessee Valley Authority:** Operates the hydroelectric power system in the Tennessee River Valley.
- **General Services Administration:** Manages and protects Federal Government property and records.
- **Federal Deposit Insurance Corporation:** Maintains stability of and public confidence in the Nation's financial system, by insuring deposits and promoting sound banking practices.

Working Conditions

Due to the wide range of Federal jobs, most of the working conditions found in the private sector also are found in the Federal Government. Most white-collar employees work in office buildings, hospitals, or laboratories, and most of the blue-collar workforce can be found in warehouses, shipyards, military bases, construction sites, national parks, and national forests. Work environments vary from comfortable and relaxed to hazardous

and stressful, such as those experienced by law enforcement officers, astronauts, and air traffic controllers.

The vast majority of Federal employees work full time, often on flexible or "flexi-time" schedules that allow workers more control over their work schedules. Some agencies also offer telecommuting or "flexi-place" programs, which allow selected workers to perform some job duties at home or from regional centers.

Some Federal workers spend much of their time away from the offices in which they are based. Inspectors and compliance officers, for example, often visit businesses and worksites to ensure that laws and regulations are obeyed. Some Federal workers frequently travel long distances, spending days or weeks away from home. Auditors, for example, may spend weeks at a time in distant locations.

Employment

In 2002, the Federal Government employed about 1.9 million civilian workers, or about 1.3 percent of the Nation's workforce. Although the Federal Government employs workers in every major occupational group, workers are not employed in the same proportions in which they are employed throughout the economy as a whole (table 2). The analytical and technical nature of many government duties translates into a much higher proportion of professional, management, business, and financial occupations in the Federal Government, compared with most industries. Conversely, the Government sells very little, so it employs relatively few sales workers.

Even though most Federal departments and agencies are based in the Washington, DC, area, fewer than 15 percent of Federal employees worked in the vicinity of the Nation's Capital in 2003. In addition to Federal employees working throughout the United States, about 3 percent are assigned overseas, mostly in embassies or defense installations.

Occupations in the Industry

Although the Federal Government employed workers in almost every occupation in 2002, about 3 out of 4 Federal workers were employed in professional and related; management, business, and financial; or office and administrative support occupations (table 3).

Professional and related occupations accounted for about a third of Federal employment. The largest group of professional workers worked in life, physical, and social science occupations, such as *biological scientists, conservation scientists and foresters, environmental scientists and geoscientists, and forest and conservation technicians*. The Department of Agriculture employed the vast majority of life scientists, but physical scientists were distributed throughout a variety of departments and agencies.

Large numbers of Federal workers also held jobs as engineers, including *aerospace, civil, computer hardware, electrical and electronics, industrial, mechanical, and nuclear engineers*. Engineers were found in many departments of the executive branch, but they most commonly worked in the Department of Defense, the National Aeronautics and Space Administration, and the Department of Transportation. In general, they solve problems

and provide advice on technical programs, such as building highway bridges or implementing agency-wide computer systems.

Professional workers employed in legal occupations include *lawyers, judges, magistrates, and law clerks*.

Table 2. Percent distribution of wage and salary employment in the Federal Government and the total for all industries by major occupational group, 2002

Occupational group	Federal Government	All industries
Total	100.0	100.0
Professional and related	31.5	19.5
Management, business, and financial	27.5	9.5
Office and administrative support	16.9	17.7
Service	11.0	18.5
Installation, maintenance, and repair	5.1	4.0
Transportation and material moving	3.1	7.1
Production	2.2	8.2
Construction and extraction	1.9	4.6
Sales and related	0.5	10.2
Farming, fishing and forestry	0.3	0.7

Computer specialists—primarily *computer software engineers, network and computer systems analysts, and computer systems administrators*—are employed throughout the Federal government. They write computer programs, analyze problems related to data processing, and keep computer systems running smoothly. Many health professionals, such as *registered nurses, physicians and surgeons, and licensed practical nurses* were employed by the Department of Veterans Affairs (VA) in one of many VA hospitals.

Management, business, and financial workers made up about 28 percent of Federal employment and were primarily responsible for overseeing operations. *Legislators*, for example, are responsible for passing and amending laws. Managerial workers include a broad range of officials who, at the highest levels, may head Federal agencies or programs. Middle managers, on the other hand, usually oversee one activity or aspect of a program.

Others provide management support. *Accountants and auditors* prepare and analyze financial reports, review and record revenues and expenditures, and investigate operations for fraud and inefficiency. *Tax examiners, collectors, and revenue agents* determine and collect taxes. *Purchasing agents* handle Federal purchases of supplies; and *management analysts* study government operations and systems and suggest improvements.

About 17 percent of Federal workers were in office and administrative support occupations. These employees aid management staff with administrative duties. Administrative support workers in the Federal Government include *secretaries* and *general office clerks*.

Compared with the economy as a whole, workers in service occupations were relatively scarce in the Federal Government. Almost three-fourths of all Federal workers in service occupations were protective service workers, such as *detectives and criminal investigators, police and sheriff's patrol officers, and correctional officers and jailers*. These workers protect the public from crime and oversee Federal prisons.

Federally employed workers in installation, maintenance, and repair occupations include *aircraft mechanics and service technicians* who fix and maintain all types of aircraft, and *electrical and electronic equipment mechanics, installers, and repairers*, who inspect, adjust, and repair electronic equipment such as industrial controls, transmitters, antennas, radar, radio, and navigation systems.

The Federal Government employed a relatively small number of workers in transportation, production, and construction occupations, such as *air traffic controllers* and *inspectors, testers, sorters, samplers, and weighers*.

Training and Advancement

Training and educational requirements in the Federal Government mirror those in the private sector for most major occupational groups. Many jobs in professional and related occupations, for example, require a 4-year college degree. Some, such as engineers, physicians and surgeons, and biological and physical scientists, require a bachelor's or higher degree in a specific field of study. Also, because managers usually are promoted from professional occupations, most have at least a bachelor's degree. However, registered nurse and many technician occupations may be entered with 2 years of training after high school. Office and administrative support workers in the government usually need only a high school diploma, although any further training or experience, such as a junior college degree or a couple of years of relevant work experience, is an asset. Most Federal jobs in other occupations require no more than a high school degree, although most departments and agencies prefer workers with vocational training or previous experience.

In general, each Federal department or agency determines its own training requirements and offers workers opportunities to improve job skills or become qualified to advance to other jobs. These may include technical or skills training, tuition assistance or reimbursement, fellowship programs, and executive leadership and management training programs, seminars, and workshops. This training may be offered on the job, by another agency, or at local colleges and universities.

Advancement in the Federal Government is commonly based on a system of occupational pay levels, or "grades." Workers enter the Federal civil service at the starting grade for an occupation and begin a "career ladder" of promotions until they reach the full-performance grade for that occupation. This system provides for a limited number of noncompetitive promotions, which usually are awarded at regular intervals, assuming job performance is satisfactory. Although these promotions do not occur more than once a year, they sometimes are awarded in the form of two-grade increases. For example, in some cases, a worker may advance from grade 7 to 9 in the first year, from grade 9 to 11 in the second year, and from grade 11 to 12 in the third year. The exact pay grades associated with a job's career track depend upon the occupation.

Typically, workers without a high school diploma who are hired as clerks start at grade 1, and high school graduates with no additional training hired at the same job start at grade 2 or 3. Entrants with some technical training or experience who are hired as technicians may start at grade 4. Those with a bachelor's

Table 3. Employment of wage and salary workers in the Federal Government, excluding the Postal Service, by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	1,922	100.0	2.6
Management, business, and financial occupations	529	27.5	5.4
Engineering managers	14	0.7	1.7
Natural sciences managers	14	0.7	11.1
Purchasing agents, except wholesale, retail, and farm products	29	1.5	1.7
Compliance officers, except agriculture, construction, health and safety, and transportation	44	2.3	1.7
Management analysts	45	2.4	22.0
All other business operations specialists	143	7.4	12.9
Accountants and auditors	34	1.8	-18.1
Tax examiners, collectors, and revenue agents	37	1.9	1.7
Professional and related occupations	605	31.5	5.1
Computer specialists	66	3.4	10.2
Engineers	87	4.6	3.6
Drafters, engineering, and mapping technicians	31	1.6	2.0
Biological scientists	22	1.1	20.8
Forest and conservation technicians	12	0.6	1.7
Lawyers	26	1.3	10.7
Physicians and surgeons	18	1.0	2.6
Registered nurses	50	2.6	7.9
Licensed practical and licensed vocational nurses	13	0.7	0.5
Service occupations	212	11.1	10.9
Correctional officers and jailers	15	0.8	22.5
Detectives and criminal investigators	23	1.2	42.7
Police and sheriff's patrol officers	18	1.0	40.7
Office and administrative support occupations	325	16.9	-10.5
Secretaries, except legal, medical, and executive	43	2.2	-17.2
Office clerks, general	25	1.3	-11.4
Construction and extraction occupations	37	1.9	4.6
Installation, maintenance, and repair occupations	97	5.1	0.0
Electrical and electronic equipment mechanics, installers, and repairers	17	0.9	1.2
Aircraft mechanics and service technicians	20	1.0	-7.9
Production occupations	42	2.2	-4.2
Transportation and material moving occupations	60	3.1	2.6
Air traffic controllers	23	1.2	11.9

NOTE: May not add to totals due to omission of occupations with small employment.

degree generally are hired in professional occupations, such as economist, with a career ladder that starts at grade 5 or 7, depending on academic achievement. Entrants with a master's degree or Ph.D. may start at grade 9. Individuals with professional degrees may be hired at the grade 11 or 12 level.

New employees usually start at the first step of a grade; however, if the position in question is difficult to fill, entrants may receive somewhat higher pay or special rates. Almost all physician and engineer positions, for example, fall into this category.

Once non-supervisory Federal workers reach the full-performance level of the career track, they usually receive periodic step increases within their grade if they are performing their job satisfactorily. They must compete for subsequent promotions, and advancement becomes more difficult. At this point, promotions occur as vacancies arise, and they are based solely on merit. In addition to within-grade longevity increases, Federal workers are awarded bonuses for excellent job performance.

Workers who advance to managerial or supervisory positions may receive within-grade longevity increases, bonuses, and promotions to higher grades. The top managers in the Federal civil service belong to the Senior Executive Service (SES), the highest positions that Federal workers can reach without being specifically nominated by the President and confirmed by the U.S. Senate. Relatively few workers attain SES positions, and competition is intense. Bonus provisions for SES positions are even more performance-based than are those for lower-level positions. Because it is the headquarters for most Federal agencies, the Washington, DC, metropolitan area offers the best opportunities to advance to upper-level managerial and supervisory jobs.

Table 4. Federal Government General Schedule pay rates, 2003

GS level	Entrance level	Step increase	Maximum level
1	\$15,214	varies	\$19,031
2	17,106	varies	21,527
3	18,664	\$622	24,262
4	20,952	698	27,234
5	23,442	781	30,471
6	26,130	871	33,969
7	29,037	968	37,749
8	32,158	1,072	41,806
9	35,519	1,184	46,175
10	39,115	1,304	50,851
11	42,976	1,433	55,873
12	51,508	1,717	66,961
13	61,251	2,042	79,629
14	72,381	2,413	94,098
15	85,140	2,838	110,682

SOURCE: U.S. Office of Personnel Management

Earnings

There are several pay systems governing the salary rates of Federal civilian employees. In 2003, the majority of Federal workers were paid under the General Schedule (GS). The General Schedule, shown in table 4, has 15 grades of pay for civilian white-collar and service workers, and smaller within-grade step increases that occur based on length of service and quality of performance. Workers in localities with high costs of living are

paid as much as an additional 21 percent, and some hard-to-fill occupations are paid more as an incentive. In general, this schedule is amended every January to reflect changes in the cost of living.

In 2003, the average worker paid under the General Schedule earned \$55,871. At \$118,002, patent administrators had the highest average earnings (table 5), while some administrative support workers started at salaries less than \$20,000.

The Federal Wage System (FWS) is used to pay most Federal workers in craft, repair, operator, and laborer jobs. This schedule sets Federal wages so that they are comparable with prevailing regional wage rates for similar types of jobs. As a result, wage rates paid under the FWS can vary significantly from one locality to another.

Table 5. Average annual salaries in the Federal Government in selected occupations, March 2003

Occupation	Salary
All occupations	\$55,871
Patent administrator	118,002
Astronomer	100,591
Attorney	96,800
Financial manager	87,508
Podiatrist	84,729
Statistician	83,472
Economist	81,852
Computer scientist	80,656
Chemist	76,857
Electrical engineer	74,909
Architect	74,581
Microbiologist	73,513
Librarian	70,238
Chaplain	69,308
Intelligence agent	68,436
Personnel specialist	66,802
Ecologist	65,207
Accountant	63,370
Budget Analyst	62,400
Physical therapist	59,910
Nurse	56,442
Botanist	55,727
Engineering technician	53,736
Border Patrol agent	49,764
Customs inspector	48,749
Law clerk	46,582
Secretary	36,744
Police officer	36,622
Fire protection and prevention worker	36,487
Medical technician	32,958
Dental assistant	30,071
Nursing assistant	29,160
Mail and file clerk	27,777

SOURCE: U.S. Office of Personnel Management

In addition to base pay and bonuses, Federal employees may receive incentive awards. These one-time awards, ranging from \$25 to \$10,000, are bestowed for a significant suggestion, a special act or service, or sustained high job performance. Some workers also may receive "premium" pay, which is granted when the employee must work overtime, on holidays, on weekends, at night, or under hazardous conditions.

Benefits are an important part of Federal employee compensation. Federal employees may choose from a number of health

plans and life insurance options; premium payments for these policies are partially offset by the Government. In addition, workers hired after January 1, 1984, participate in the Federal Employees Retirement System (FERS), a three-tiered retirement plan including Social Security, a pension plan, and an optional Thrift Savings Plan. Worker participation in the Thrift Savings Plan is voluntary, but any contributions made are tax-deferred and, up to a point, matched by the Federal Government. In addition to other benefits, some Federal agencies provide public transit subsidies in an effort to encourage employee use of public transportation.

Federal employees receive both vacation and sick leave. They earn 13 days of vacation leave a year for the first 3 years, 20 days a year for the next 12 years, and 26 days a year after their 15th year of service. Workers also receive 13 days of sick leave a year, which may be accumulated indefinitely. About a third of all Federal civilian employees were union members or covered by union contract, more than double the proportion of workers in all industries.

Outlook

Wage and salary employment in the Federal Government is projected to grow by 3 percent through the year 2012, while the salaried economy as a whole is expected to grow by 16 percent. Job growth generated by increased homeland security needs may be largely offset by projected slow growth or declines in other Federal sectors due to governmental cost-cutting, the growing use of private contractors, and continuing devolution—the practice of turning over the development, implementation, and management of some programs of the Federal Government to State and local governments.

Because of its public nature, the factors that influence Federal Government staffing levels are unique. The Congress and President determine the Government's payroll budget prior to each fiscal year, which runs from October 1 through September 30. Changes in public policy priorities can result in increasing levels of Federal employment in some programs and declines in others. For example, Department of Defense civilian employment, which accounts for about 35 percent of Federal civilian employment, has been on the decline in recent years. Although this decline is expected to level off over the next decade, the emphasis on reduced government payrolls will lead to decreases in employment in many other agencies.

The attacks of September 11, 2001, spurred the creation of DHS and major reorganization of several executive departments, offices, and agencies. Demand will continue to grow for specialized workers in areas related to border and transportation security, emergency preparedness, public health, and information analysis. The employment implications of changing Federal priorities remain uncertain, but a portion of employment gains could be offset by reductions due to overlapping functions of various Federal agencies.

Any employment declines generally will be carried out through attrition—simply not replacing workers who retire or

leave the Federal Government for other reasons. Layoffs, called “reductions in force,” have occurred in the past, but they are uncommon and usually affect relatively few workers. In spite of attrition, there still will be numerous employment opportunities in many agencies due to the need to replace workers who leave the workforce, retire, or accept employment elsewhere. The proportion of the federal civilian workforce eligible for retirement has increased significantly over the last decade with the aging of the federal workforce.

Competition is expected for some Federal positions, especially during times of economic uncertainty, when workers seek the stability of Federal employment. In general, Federal employment is considered to be relatively stable because it is not affected by cyclical fluctuations in the economy, as are employment levels in many construction, manufacturing, and other private sector industries.

The distribution of Federal employment will continue to shift toward a higher proportion of professional, business operations, and protective service workers, as employment declines will be most rapid in administrative support and production occupations. Employment of office and administrative support workers in the Federal Government will be adversely affected by office automation. Employment among production occupations is expected to decline as many of their functions are contracted out to private companies.

Sources of Additional Information

Information on obtaining a position with the Federal Government is available from the Office of Personnel Management (OPM) through a telephone-based system. Consult your telephone directory under U.S. Government for a local number or call (703) 724-1850; Federal Relay Service: (800) 877-8339. The first number is not tollfree, and charges may result. Information also is available from the OPM Internet site: <http://www.usajobs.opm.gov>

The duties of Federal Government workers are similar to those of their private sector counterparts. Further information on many Federal Government occupations, including those listed below, can be found in the 2004-05 edition of the *Occupational Outlook Handbook*.

- Accountants and auditors
- Correctional officers
- Court reporters
- Judges, magistrates, and other judicial workers
- Lawyers
- Management analysts
- Police and detectives
- Probation officers and correctional treatment specialists
- Registered nurses
- Tax examiners, collectors, and revenue agents
- Top executives
- Job opportunities in the Armed Forces

State and Local Government, Excluding Education and Hospitals

SIGNIFICANT POINTS

- Local government employs more than three times as many service workers than does State government; most are firefighters and law enforcement workers.
- The attacks of September 11, 2001, will increase demand for police, firefighters, and other emergency personnel; however, budgetary constraints may force spending cuts in other areas, slowing overall employment growth.
- Employer-provided benefits are more common among State and local government employees than among workers in the private sector.

Nature of the Industry

State and local governments provide their constituents with vital services, such as transportation, public safety, healthcare, education, utilities, and courts. Excluding education and hospitals, State and local governments employ about 7.9 million workers, placing them among the largest employers in the economy. Around two-thirds of these employees work for local governments, such as counties, cities, special districts, and towns. (State and local government hospitals are included in the health services industry and public education is a major part of educational services, both of which are discussed elsewhere in the *Career Guide*.)

In addition to the 50 State governments, there are about 87,500 local governments, according to the U.S. Census Bureau. These include about 3,000 county governments; 19,400 municipal governments; 16,500 townships; 13,500 school districts; and 35,100 special districts. Illinois had the most local government units, with more than 6,900; Hawaii had the fewest, with 20.

In many areas of the country, citizens are served by more than one local government unit. For example, most States have *counties*, which may contain various municipalities such as cities or towns, but which also often include unincorporated rural areas. *Townships*, which do not exist in some States, may or may not contain municipalities and often consist of suburban or rural areas. Supplementing these forms of local government, *special district* government bodies are independent, limited purpose governmental units that usually perform a single function or activity. For example, a large percentage of special districts manage the use of natural resources. Some provide drainage and flood control, irrigation, and soil and water conservation services.

The Council of State Governments reports that State and local governments' responsibilities were augmented in the 1990s through "devolution," the practice through which the Federal Government turns over to State and local governments the development, implementation, and management of programs. Welfare reform typifies devolution in practice, with States receiving considerable leeway to devise programs that meet their needs as a result of the 1996 Congressional reform act that provided block grants to States. As the relationship between levels of government continues to change in the coming decade, so will the nature of services provided by State and local governments.

Working Conditions

Working conditions vary by occupation and, in some instances, by size and location of the State or local government. For example, chief executives in very small jurisdictions may work less than 20 hours a week; in larger jurisdictions, they often work more than 40 hours per week. Chief executives in large jurisdictions work full time year round, as do most county and city managers. Most State legislators work full time only when in session, usually for a few months a year, and work part time the rest of the year. Local elected officials in some small jurisdictions work part time.

Most professional, financial operations, and office and administrative support workers in State and local government work a standard 40-hour week in an office environment. However, workers in some of the most visible local government jobs have very different working conditions and schedules. Firefighters' hours are longer and vary more widely than those of most workers. Many professional firefighters are on duty for several days in a row, working over 50 hours a week, because some must be on duty at all times to respond to emergencies. They often eat and sleep at the fire station. Following this long shift, they are then off for several days in a row or for the entire next week. In addition to irregular hours, firefighting can involve the risk of death or injury. Some local fire districts also use the services of volunteer firefighters, who tend to work shorter, regularly scheduled shifts.

Law enforcement work also is potentially dangerous. The injury and fatality rates among law officers are higher than in many occupations, reflecting risks taken in apprehending suspected criminals and responding to various emergency situations such as traffic accidents. Most police and detectives work 40 hours a week, with paid overtime when they testify in court or work on an investigation. Because police protection must be provided around the clock, some officers work weekends, holidays, and nights. Many officers are subject to call any time their services are needed and are expected to intervene whenever they observe a crime, even if they are off duty.

Most driver/operator jobs in public transit systems are stressful and fatiguing because they involve dealing with passengers, tight schedules, and heavy traffic. Bus drivers with regular routes and subway operators generally have consistent weekly work

schedules. Those who do not have regular schedules may be on call and must be prepared to report for work on short notice. To accommodate commuters, many operators work split shifts, such as 6 a.m. to 10 a.m. and 3 p.m. to 7 p.m., with time off in between.

A number of other State and local government jobs also require weekend or night work. Because electricity, gas, and water are used continuously throughout each day, split, weekend, and night shifts are common for utility workers.

Employment

State and local governments, excluding education and hospitals, employed about 7.9 million people in 2002. Two out of every three of these workers were employed in local government (table 1).

Table 1. Wage and salary employment in state and local government, except education and health, 2002
(Employment in thousands)

Jurisdiction	Employment	Percent
State and local	7,851	100.0
Local	5,415	69.0
State	2,436	31.0

Local government employs more than three times as many service workers than does State government; most are firefighters and law enforcement workers (chart 1).

Occupations in the Industry

Service occupations made up the largest share of employment in State and local governments, accounting for 31 percent of all jobs (table 2). Of these, *police and sheriff's patrol officers, bailiffs, correctional officers and jailers, and firefighters* were the largest occupations. Professional and related occupations accounted for 21 percent of employment; office and administrative

support occupations accounted for 20 percent; and management, business, and financial occupations constituted 11 percent.

State and local governments employ people in occupations found in nearly every industry in the economy, including chief executives, managers, engineers, computer occupations, secretaries, and health technicians. Certain occupations, however, are mainly or exclusively found in these governments, such as legislators; tax examiners, collectors, and revenue agents; urban and regional planners; judges, magistrates, and other judicial workers; police and sheriff's patrol officers; and correctional officers and jailers.

Chief executives, general and operations managers, and legislators establish government policy and develop laws, rules, and regulations. They are elected or appointed officials who either preside over units of government or make laws. Chief executives include governors, lieutenant governors, mayors, and city managers. General and operations managers include district managers and revenue directors. Legislators include State senators and representatives, county commissioners, and city council members.

Tax examiners, collectors, and revenue agents determine tax liability and collect past-due taxes from individuals or businesses. *Urban and regional planners* draft plans and recommend programs for the development and use of resources such as land and water. They also propose construction of physical facilities, such as schools and roads, under the authority of cities, counties, and metropolitan areas. Planners devise strategies outlining the best use of community land and identify the places in which residential, commercial, recreational, and other types of development should be located.

Judges arbitrate, advise, and administer justice in a court of law. They oversee legal processes in courts and apply the law to resolve civil disputes and determine guilt in criminal cases. *Magistrates* resolve criminal cases not involving penitentiary sentences, as well as civil cases involving damages below a sum specified by State law.

Social workers counsel and assess the needs of clients, refer them to the appropriate sources of help, and monitor their progress. *Eligibility interviewers, government programs* interview and investigate applicants and recipients to determine eligibility to receive, or continue receiving, welfare and other types of social assistance. *Social and human service assistants'* duties vary with specific job titles. These workers include social service technicians, case management aides, social work assistants, residential counselors, alcoholism or drug abuse counseling aides, child abuse workers, community outreach workers, and gerontology aides. *Probation officers and correctional treatment specialists* assist in rehabilitation of law offenders in custody or on probation or parole.

Court, municipal, and license clerks perform a variety of State and local government administrative tasks. *Court clerks* prepare dockets of cases to be called, secure information for judges, and contact witnesses, lawyers, and attorneys to obtain information for the court. *Municipal clerks* draft agendas for town or city councils, record minutes of council meetings, answer official correspondence, keep fiscal records and accounts, and prepare reports on civic needs. *License clerks* keep records and help the public obtain motor vehicle ownership titles, operator permits,

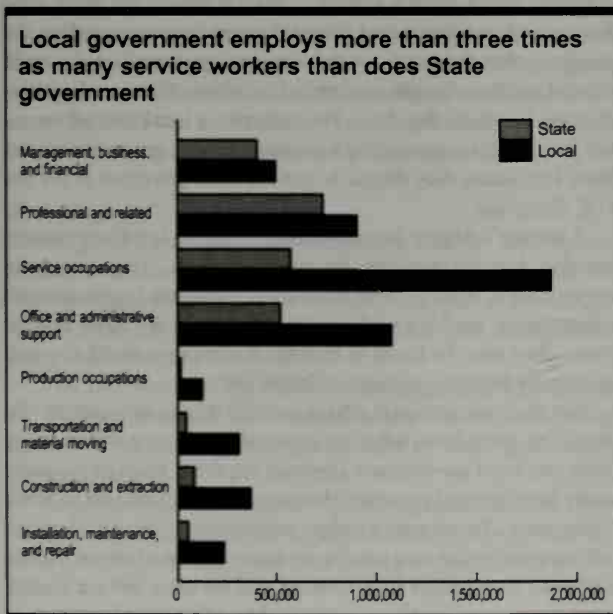


Table 2. Employment of wage and salary workers in state and local government, excluding education and hospitals, by occupation, 2002 and projected change, 2002-12
(Employment in thousands)

Occupation	Employment, 2002		Percent change, 2002-12
	Number	Percent	
All occupations	7,851	100.0	9.7
Management, business, and financial occupations	891	11.3	9.1
General and operations managers	75	0.9	6.4
Legislators	66	0.8	1.1
Professional and related occupations	1,624	20.7	12.1
Computer specialists	126	1.6	16.5
Engineers	91	1.2	11.8
Social workers	159	2.0	7.7
Probation officers and correctional treatment specialists	81	1.0	13.9
Social and human service assistants	80	1.0	4.4
Registered nurses	92	1.2	5.7
Service occupations	2,434	31.0	16.7
First-line supervisors/managers, law enforcement workers	134	1.7	15.4
Fire fighters	262	3.3	21.2
Bailiffs, correctional officers, and jailers	410	5.2	22.1
Detectives and criminal investigators	70	0.9	15.7
Police and sheriff's patrol officers	588	7.5	24.4
Janitors and cleaners, except maids and housekeeping cleaners ...	102	1.3	7.7
Recreation workers	114	1.4	10.6
Office and administrative support occupations	1,586	20.2	-1.6
Bookkeeping, accounting, and auditing clerks	106	1.3	-1.4
Court, municipal, and license clerks	101	1.3	12.3
Eligibility interviewers, government programs	88	1.1	-12.9
Police, fire, and ambulance dispatchers	84	1.1	10.5
Secretaries and administrative assistants	304	3.9	-4.9
Word processors and typists	69	0.9	-44.5
Office clerks, general	303	3.9	4.6
Construction and extraction occupations	448	5.7	10.7
Highway maintenance workers	143	1.8	9.7
Installation, maintenance, and repair occupations	286	3.6	8.9
Maintenance and repair workers, general	114	1.5	10.0
Production occupations	144	1.8	9.0
Water and liquid waste treatment plant and system operators	78	1.0	9.9
Transportation and material moving occupations	352	4.5	2.6
Bus drivers, transit and intercity	107	1.4	4.7

NOTE: May not add to totals due to omission of occupations with small employment.

and a variety of other permits and licenses. State and local governments also employ many *secretaries and administrative assistants and general office clerks*.

Firefighters control and extinguish fires, assist with emergency medical treatment, and help with the recovery from natural disasters such as earthquakes and tornadoes. *Fire inspectors* inspect public buildings for conditions that might present a fire hazard. *Emergency medical technicians and paramedics* assess injuries, administer emergency medical care, and extricate trapped individuals. They transport injured or sick persons to medical facilities.

Police and sheriff's patrol officers and detectives and criminal investigators have duties that range from controlling traffic to preventing and investigating crimes. They maintain order; enforce laws and ordinances; issue traffic summonses; investigate accidents; give evidence in court; serve legal documents for the court system; and apprehend, arrest, and process prisoners. State and local *correctional officers* guard inmates in jails, prisons, or juvenile detention institutions. *Bailiffs* keep order in courts.

Highway maintenance workers maintain highways, municipal and rural roads, airport runways, and rights-of-way. They patch broken or eroded pavement, repair guard rails and highway markers, plow snow, and mow or clear brush from along roads. *Bus drivers* pick up and deliver passengers at prearranged stops throughout their assigned routes. Operators may collect fares, answer questions about schedules and transfer points, and announce stops.

Training and Advancement

The education level and experience needed by workers in State and local government varies by occupation. Voters elect most chief executives and legislators, so local support is very important. Taking part in volunteer work and helping to provide community services are valuable ways in which to establish vital community support. Those elected to chief executive and legislator positions come from a variety of backgrounds, but must conform to age, residency, and citizenship regulations regarding the positions that they seek. Advancement opportunities for most elected public officials are limited to other offices in the jurisdictions in which they live. For example, a local council member may run for mayor or for a position in State government, and State legislators may decide to run for State governor or for the U.S. Congress.

A master's degree in public administration is widely recommended, but not required, for city managers. They may gain experience as management analysts or assistants in government departments, working with councils and mayors. After several years, they may be hired to manage a town or a small city and eventually become manager of larger cities.

For most professional jobs, a college degree is required. To obtain an entry-level urban or regional planning position, most State and local government agencies require 2 years of graduate study in urban and regional planning or the equivalent in work experience. To become a judge, particularly a State trial or appellate court judge, one usually is required to be a lawyer. About half of all State judges are appointed, and the other half are elected in partisan or nonpartisan elections. Most State and local judges

serve fixed terms, ranging from 4 or 6 years for limited jurisdiction judges to 14 years for some appellate court judges.

Most applicants for firefighting jobs must have a high school education or its equivalent and pass a civil service examination. In addition, they need to pass a medical examination and tests of strength, physical stamina, coordination, and agility. Experience as a volunteer firefighter or as a firefighter in the Armed Forces is helpful, as is completion of community college courses in fire science. Recruits study firefighting techniques, fire prevention, local building codes, emergency procedures, and the proper use of rescue equipment. Firefighters may be promoted depending on written examination results and job performance.

Bus drivers must comply with Federal regulations that require drivers who operate vehicles designed to transport 16 or more passengers to obtain a commercial driver's license from the State in which they live. To qualify for a commercial driver's license, applicants must pass a written test on rules and regulations and demonstrate that they can operate a commercial vehicle safely. For subway and streetcar operator jobs, applicants with at least a high school education have the best chance. In some cities, prospective subway operators are required to work as bus drivers for a specified period. Successful applicants generally are in good health, possess good communication skills, and are able to make quick, sound judgments. Because bus drivers and subway operators deal with passengers, they need an even temperament and emotional stability. Driving in heavy, fast-moving, or stop-and-go traffic and dealing with passengers can be stressful.

Police departments in most areas require applicants to be U.S. citizens of good character, at least 20 years old, and able to meet rigorous physical and mental standards. Police departments increasingly encourage applicants to take college courses, and some require a college degree. Many community and junior colleges, as well as colleges and universities, offer programs in law enforcement or criminal justice. Officers usually attend a local or regional police academy that includes classroom instruction in constitutional law, civil rights, and State and local law. They also receive training in patrol, accident investigation traffic control, using firearms, self-defense, first aid, and emergency management. Promotions for police officers are highly influenced by scores on a written civil service examination and subsequent performance evaluations by their superiors.

Earnings

Earnings vary by occupation, size of the State or locality, and region of the country. As in most industries, professionals and managers earn more than other workers. Earnings in the occupations having the largest employment in State and local government appear in table 3.

The International City/County Management Association (ICMA) reported the 2002 median annual salaries of selected executive and managerial occupations in local government shown in table 4.

Employer-provided benefits—including health and life insurance and retirement benefits—are more common among State and local government employees than among workers in the private sector.

Table 3. Median hourly earnings of the largest occupations in state and local government, except education and health, 2002

Occupation	Local government	State government	All industries
Police and sheriff's patrol officers	\$20.20	\$22.64	\$20.32
Fire fighters	17.92	13.58	17.42
Bus drivers, transit and intercity	16.95	—	14.22
Water and liquid waste treatment plant and system operators	15.97	—	16.05
Correctional officers and jailers	15.08	15.99	15.71
Maintenance and repair workers, general	14.83	13.73	14.12
Court, municipal, and license clerks	12.90	14.34	13.12
Office clerks, general	12.03	12.56	10.71
Janitors and cleaners, except maids and housekeeping cleaners	10.95	11.25	8.77
Recreation workers	8.98	15.95	8.69

Outlook

Wage and salary employment in State and local government is projected to increase about 10 percent during the 2002-12 period, slower than the 16-percent growth projected for all sectors of the economy combined. Job growth will stem from the rising demand for services at the State and local levels. An increasing population and State and local government assumption of responsibility for some services previously provided by the Federal Government are fueling the growth of these services. Despite the increased demand for the services of State and local governments, employment growth will be dampened by budgetary constraints due to a slower growing economy, reductions in

Table 4. Median annual salary for selected executive and managerial occupations in local government, 2002

Occupation	Salary
City manager	\$85,000
Assistant chief administrative officer	74,486
Engineer	70,011
Chief financial officer	67,688
Information services director	67,248
Chief administrative officer	66,950
Fire chief	64,141
Economic development director	63,847
Chief law enforcement official	62,005
Human resources director	61,156
Public works director	60,570
Parks and recreation director	56,000
Human services director	55,684
Health officer	55,209
Purchasing director	52,728
Chief librarian	48,000
Treasurer	46,200
Clerk	44,071
Chief elected officials	11,300

SOURCE: International City/County Management Association (ICMA).

Federal aid, especially at the county level, and resistance from citizens to tax increases. When economic times are good, many State and local governments increase spending on programs and employment.

Professional and service occupations accounted for over half of all jobs in State and local government. Most new jobs will stem from steady demand for community and social services, health services, and protective services. For example, increased demand for services for the elderly, the mentally impaired, and children will result in steady growth in the numbers of social workers, registered nurses, and recreation workers. Job growth in protective service occupations will be stimulated by rising demand for law enforcement officers due to population increase and the events surrounding September 11, 2001, specifically the creation of the Federal Department of Homeland Security. This new department will work with local and State law enforcement to ensure the safety of the Nation and our borders. Correctional officers will be in demand to oversee the increasing population of convicted offenders.

Employment of management, business, and financial occupations is projected to grow more slowly than employment in State and local government overall. The number of chief executives and general managers should remain fairly stable. Employment change occurs in rare situations, such as when a small town switches from a volunteer chief executive to a manager or paid mayor. Employment in office and administrative support occupations in State and local government is expected to decline, as the increasing use of personal computers by professionals and managers continues to reduce the need for secretaries and word processors and typists.

Sources of Additional Information

Individuals interested in working for State or local government agencies should contact the appropriate agencies. City, county, and State personnel and human resources departments, and local offices of State employment services have applications and additional information.

Other information about careers in government is available from:

- The Council of State Governments, P.O. Box 11910, Lexington, KY 40578-1910.
Internet: <http://www.csg.org>
- International City Management Association (ICMA), 777 North Capital St. NE., Suite 500, Washington, DC 20002.
Internet: <http://www.icma.org>
- International Public Management Association for Human Resources, 1617 Duke St., Alexandria, VA 22314.
Internet: <http://www.ipma-hr.org>
- National Association of Counties, 440 First St. NW., Suite 800, Washington, DC 20001.
Internet: <http://www.naco.org>
- National Association of State Personnel Executives, P.O. Box 11910, Lexington, KY 40578-1910.
Internet: <http://www.naspe.net>
- National League of Cities, 1301 Pennsylvania Ave., NW., Suite 550, Washington, DC 20004-1763.
Internet: <http://www.nlc.org>

Information on many occupations commonly employed by State and local governments may be found in the 2004-05 *Occupational Outlook Handbook*:

- Bus drivers
- Correctional officers
- Court reporters
- Firefighting occupations
- Judges, magistrates, and other judicial workers
- Lawyers
- Police and detectives
- Probation officers and correctional treatment specialists
- Social and human service assistants
- Social workers
- Tax examiners, collectors, and revenue agents
- Top executives
- Urban and regional planners

Sources of State and Local Labor Market and Career Information

State and local labor market and career information is available from State employment security agencies. These agencies develop detailed information about local labor markets, such as current and projected employment by occupation and industry, characteristics of the work force, and changes in State and local area economic activity. Listed below are addresses and telephone numbers of the directors of research and analysis in these agencies and, in most cases, Internet addresses of these agencies.

Alabama

Chief, Labor Market Information Division, Department of Industrial Relations, 649 Monroe Street, Room. 427, Montgomery, AL 3613-2280. Phone: (334) 242-8859.

Internet: <http://www.dir.state.al.us/lmi>

Alaska

Chief, Research & Analysis Section, Department of Labor & Workforce Development, 1111 West 8th Street, Juneau, AK 99802-5501. Phone: (907) 465-6035.

Internet: <http://almis.labor.state.ak.us/>

Arizona

Research Administrator, Department of Economic Security, 1789 West Jefferson Street, 733A, Phoenix, AZ 85007-3295. Phone: (602) 542-3871. Internet: <http://www.workforce.az.gov>

Arkansas

Director, Labor Market Information, Employment Security Department, P.O. Box 2981, Little Rock, AR 72203-2981. Phone: (501) 682-3159. Internet: <http://www.state.ar.us/esd>

California

Chief, Labor Market Information Division, MIC57, Employment Development Department, 7000 Franklin Boulevard, Building 1100, Sacramento, CA 95823. Phone: (916) 262-2160.

Internet: <http://www.calmis.cahwnet.gov/>

Colorado

Director, Labor Market Information, Department of Labor & Employment, 1515 Arapahoe Street, Tower 2, Suite 300, Denver, CO 80202-2117. Phone: (303) 318-8898.

Internet: <http://www.coworkforce.com/lmi>

Connecticut

Director, Employment Security Division, Research & Information, Department of Labor, 200 Folly Brook Boulevard, Wethersfield, CT 06109-1114. Phone: (860) 263-6255.

Internet: <http://www.ctdol.state.ct.us/lmi/index.htm>

Delaware

Chief, Office of Occupational & Labor Market Information, Department of Labor, 4425 N. Market Street - Fox Valley Annex, Wilmington, DE 19809-1307. Phone: (302) 761-8050, (302) 761-6598.

Internet: <http://www.oolumi.net/>

District of Columbia

Chief, Office of Labor Market Research & Information, 64 New York Ave, NE, Suite 3035, Washington, D.C. 20002. Phone: (202) 671-1633.

Internet: http://does.ci.washington.dc.us/info/labor_mkt.shtm

Florida

Process Manager, Labor Market Statistics, Agency for Workforce Innovation, MSC G-020, 107 E. Madison Street, Tallahassee, FL 32399-4111. Phone: (850) 488-1048.

Internet: <http://www.labormarketinfo.com>

Georgia

Director, Workforce Information & Analysis, Rm. 300, Department of Labor, 223 Courtland Street, CWC Building, Atlanta, GA 30303. Phone: (404) 232-3875.

Internet: http://www.dolstate.ga.us/em/get_labor_market_information.htm

Guam

Director, Government of Guam, Sunny Plaza, 2nd Floor, 125 Tun Jesus Crisostomo, Tamuning, GU 96911. Phone: (671) 647-7066.

Hawaii

Chief, Research & Statistics Office, Department of Labor & Industrial Relations, 830 Punchbowl Street, Room 304, Honolulu, HI 96813. Phone: (808) 586-8999.

Internet: <http://www.state.hi.us/dlir/rs/loihi/>

Idaho

Chief, Research and Analysis Bureau, Department of Labor, 317 Main Street, Boise, ID 83735-0670. Phone: (208) 334-6170.

Internet: <http://www.labor.state.id.us/lmi/id-lmi.htm>

Illinois

Director, Economic Information & Analysis, Illinois Department of Employment Security, 401 South State Street, 7th Floor-North, Chicago, IL 60605. Phone: (312) 793-2316.

Internet: <http://lmi.ides.state.il.us/>

Indiana

Director, Labor Market Information - South E211, Department of Workforce Development, 10 North Senate Avenue, Indianapolis, IN 46204-2277. Phone: (317) 232-7460.

Internet: <http://www.dwd.state.in.us/>

Iowa

Division Administrator, Information and Policy Division, Iowa Workforce Development, 1000 East Grand Avenue, Des Moines, IA 50319-0209. Phone: (515) 281-0255.

Internet: <http://www.state.ia.us/iwd>

Kansas

Chief, Labor Market Information Services, Department of Human Resources, 401 SW Topeka Boulevard, Topeka, KS 66603-3182. Phone: (785) 296-5058.

Internet: <http://laborstats.hr.state.ks.us/>

Kentucky

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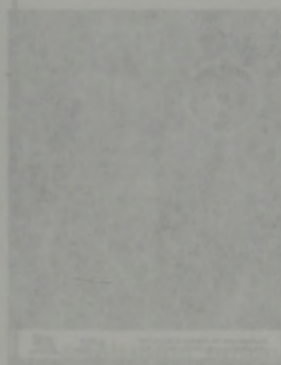
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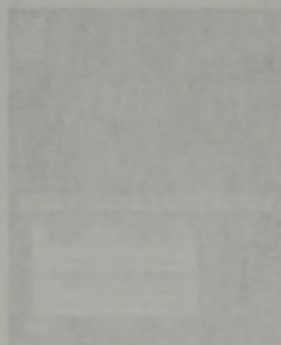


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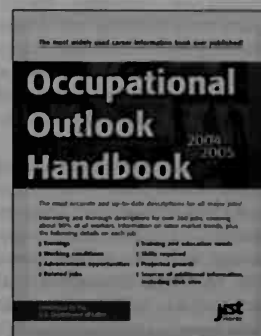
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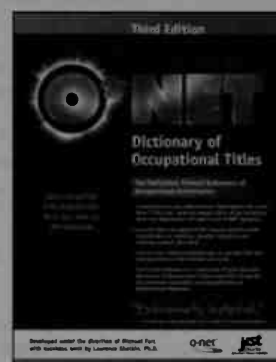
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